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BIBLIOGRAPHY ON
SERRATIA MARCESCENS

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## BIBLIOGRAPHY ON

## SERRATIA MARCESCENS

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*****	Contents:
Λ-	- · ·
A.	Ecology. Detection. Identification & Classification 1
II.	Culture & Morphology 3
III.	Variation 5
ïv.	Nutrition. Metabolism. Enzymes 8
\$. <del>4</del>	Effects of Chemical Agents on Serratia marcescens 15
17	Effects of Physical Agents on Serratia marcescens 20
vi i	Viability
VIII.	
AT##.	Prodigiosin: Factors Affecting Pigmentation
11.	Lipoids from Serratia marcescens
X.	Polysaccharides from Serratia marcescens: Effect on Tumors 29
Ţ٦.	Anti-biotics & Antibacterial Effects of Serratia marcescens 35
XII.	Toxins and Pyrogens
XIII.	Serology
x <b>x</b> v.	Pathogenicity
Żν.	Bacteriophage
хVI	Nutrient Effects of Serratia marcescens
-E 1,	···
XVII.	Vital Staining of Infusoria by Serratia marcescens 45
xv <b>ii</b> i.	Economic Importance: Presence in Foods
MX.	Asrosols and Miscellaneous Uses for Serratia marcescens 47
ÆX.	Influence of Serratia marcescens in Digestive & Intestinal Tract
Aut	hor Index50

References marked with an (\*) asterisk are those which are available for losn in the Camp Detrick Technical Library. This bibliography is being kept up to date by a file of current references which is available in the library.



#### BIBLIOGRAPHY ON

#### SERRATIA MARCESCENS

#### ECOLOGY . DETECTION. IDENTIFICATION AND CLASSIFICATION

- \* Breed, R.S.; and Breed, M.E.
  The genus Serratia Bizio.
  Zentr. Bakt. Abt. II. 71:
  435-440, 1937.
- \* Breed, R.S.; and Breed, M.E.
  The type species of the genus Serratia, commonly known as Bacillus prodigiosus. J. Bact. 9: 545-557, 1924.
  Abstr. Bact. 8: # 26 (1924).
- \* Frank.

  Is there more than one form of Bacillus prodigiosus?
  Zentr. Bakt. Abt. I. 132: 78-81, 1934.
- \* Imshenetskii, A.A.
  Ecology of pigmented
  microBrganisms.
  Mikrobiologiya (U.S.S.R.)
  15: 422-427, 1946.

Lasseur, Ph.; and Decker, R.
Development of Bacillus
prodigiosus type Ra. Trav.
Lab. Microbiol. Fac. Pharm.
Nancy. 11: 21, 1938.
Biol. Abstr. # 1296 (1940)

Lasseur, Ph.; Marchal, J.G.; and Maguitot, C. Capillary analysis and isolation of bacteria from

isolation of bacteria from a bacterial mixture. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 7: 105-115, 1934. Biol. Abstr. # 9851 (1935).

Lasseur, Ph.; Dupaix-Lasseur, A; Georges, H.; et Laurent, P.
Essai de différenciation des types dissociés de diverses especes bactériennes par la conductibilite de leurs suspensions. Trav. Lab. Microbiol. Fac. Parm. Nancy. 12: 94-112, 1939-1941.
Biol. Abstr. # 22046 (1945)

Lasseur, Ph.; and Palgen, W. A curious type of Bacillus prodigiosus colony. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 7: 73-74, 1934. Biol. Abstr. # 9848 (1935)

Melcion, Rene.
Contribution à 1' étude de deux bacteries chromogènes rouges et determination de leur place dans la classification. Thesis: Lac. Microbiol. Pharm., Univ. Nancy, 1941. Biol. Abstr. # 2978 (1946)

## I. Ecology. Detection. Identification and Classification

\* Schreiner, R.; and Snow, L.M.
An unusual strain of
Serratia marcescens Bizio.
Sci. 63: 18-19, 1926.
Biol. Abstr. # 840 (1926).

Schad, G.
Identification of colorless prodigiosus bacilli by aggulation. Arch. Hyg. 104: 99-104, 1930. Biol. Abstr. #21475 (1936).

\* Slavnina, G.P.

The application of the fluorescence analysis for the identification of some bacteria oxidizing hydrocarbons. Mikrobiol.(U.S.S.R.) 17(1): 76-81, 1948.
Biol. Abstr. # 2004 (1950).

Symon, Karel.

A simple method for determining Bacterium prodigiosus in water, and its practical use.

Spisy. Lekarske. Fak.

Masarykovy Univ.(Brno).

21(4): 1-7, 1947.

Biol. Abstr. # 30367 (1950)

Testa, E.
Group of bacteria with red pigment cultivated in sugared media. Gior. Ital. Mal. esot. trop. 3: 246-251, 1930.

## \* Beguet, M.

Variations de la tension superficielli et du pH dans l'evolution d'une culture bacterienne en boulllon normal. (Etude faite sur Bacillus prodigiesus. Compt. rend. soc. biol. 147: 797-801, 1953.

#### Blawat, F.

Badania nad biologicznymi metodami odtlenienia baktery-jnych hodowli beztlenowych. Studies in biological methods of oxygen rediction in Anaerobic cultures in bacteria. Przeglad Epidemiol. (Warsaw). 3(1/2): 87-204, 1949.

#### Blawat, F.

Investigations on biological methods of anaerobic bacterial cultures. Bull. Inst.
Marine and Trop. Med. 2(3/4): 221-225, 1949.
Biol. Abstr. # 36577 (1950).

## Churchman, J.W.

The cause of the parallelism between the Gram reaction and the gentian violet reaction. Proc. Soc. Exper. Biol. Med. 18: 17-18, 1920-1921.

#### Fortner, J.

Modern surface culture and microscopy of the anaerobes. Z. Infektionskrankh. parasit. Krankh. Hyg. Haustiere. 40: 258-267, 1932. Biol. Abstr. # 1402,(1933).

\* Fortner, J.

Uber den heutigen Stan
der Anaeroben-Bakteriologie.

der Anaeroben-Bakteriologie. Zentr. Bakt. Parasitenk. Abt. I. Orig. 152 (1): 58-60, 1947. Biol. Abstr. # 6740 (1948).

\* Gray, P.H.H.
Staining bacterial
capsules. J. Bact. 45(3):
301-302, 1943.

Biol. Abstr. # 20522 (1943).

## Heinzel, E.

Experimentelle Untersuchungen zur Ausbildung von Faden-und-Kettenformen bei Bacterium prodigiosum. Arch. Mikrobiol. 15: 119-136, 1950. Biol. Abstr. # 18530 (1952).

#### Heinzel, E.

The formation of filamentary and chain forms of Serratia marcescens. Arch. Mikrobiol. 15: 119-136, 1950. Chem. Abstr. # 10620b (1953).

## \* Jennison, M.W.

Some quantitative relationship in bacterial population cycles. J. Bact. 30: 603-623, 1935.

Jones, V.E.; and Davis, J.G.

The effect of pure cultures on the reduction of resazurin in milk. Proc. Soc. Agric. Bact. (Gt. Brit.)
15: 38-39, 1944.
Biol. Abstr. # 1260 (1946).

#### II. Culture and Morphology

Kufferath, H.

The morphology and cultivation of B. coli and other bacteria upon lactose "mineralized" agar. Compt rend. soc. biol. 85: 16-18, 1921.
Abstr. Biol. # 1249 (1920).

Landesman, M.

Intensity and character of mobility of Bacillus prodigios—us under influence of changing hydrogen ion concentration of medium. Med. Doswiadcz. i Spol. 18: 206-228, 1934.

Lasseur, Ph.; and Dupaix-Lasseur, A
Culture of some chromogenic
bacteria on glycinerated potatoe.
Influence of the quantity of
glycerol to an aspect of the
culture. Trav. Lab. Microbiol.
Fac. Pharm. Nancy. 7: 45-51,
1934.
Biol. Abstr. # 9843 (1935).

\* Marshall, M.S.; and Nordby, H.P. Anaerobic plates. J. Bact. 44(5): 619, 1942. Biol. Abstr. # 11897, 1943.

- \* Ramchandani, J.C.
  Saltations in bacteria. II.
  Bacillus prodigiosus. Ann. Bot.
  43: 579-586, 1929.
  Biol. Abstr. # 13817 (1932).
- \* Steinhaus, E.A.; and Birkeland, J.M.
  Studies on the life and death
  of bacteria. I. The senescent
  phase in aging cultures and
  the probable mechanisms involved.
  J. Bact. 38: 249-261, 1939.

Trillet, A.

Influence of the divided state of microbial droplets on the inoculation of culture media. Rev. Hyg. 42: 121-124, 1921.

Abstr. Bact. #127 (1922).

\* Wahlin, J.G.; and Almaden, P.J.
The megalomorphic phase of
bacteria. J. Infectious Diseases.
65: 147-155, 1939.

\* Beguet, M.

All the state of t

THE REPORT OF THE PERSON NAMED AND PARTY OF THE PERSON NAMED IN PARTY OF T

Etude des conditions d'apparâtion des types dits mutant dans les cultures microbiennes; étude faite sur B. prodigiosus.
Compt. rend. soc. biol. 147(3-4): 260-261, 1953.

Béguet, M.

Production of variations in fixed characters of Coccobacillus prodigiosus. Compt. rend. soc. biol. 110: 1025-1026, 1932.

\* Beguet, M.

Temporary or permanent type variations produced in Serratia marcescnes. Compt. rend. soc. biol. 146: 820-821, 1952. Chem. Abstr. # 4416f (1953).

\* Beguet, M.

Variations of aging in normal bouillon. Arch. Inst. Pasteur Algerie. 31(3): 295-303, 1953.

\* Bunting, M.I.

Description of some color variants produced by Serratia marcescens, strain 274.

J. Bact. 40: 57-68, 1940.

\* Bunting, M.I.

The effect of surfaceactive agents on color variation in aging populations of Serratia marcescens. J. Bact. 59(2): 241-250, 1950. Biol. Abstr. # 12760 (1950). \* Bunting, M.I.
Factors affecting
distribution of color
variants in aging broth
cultures of Segratia marcescens # 274. J. Bact.
43(5): 593-606, 1942.
Biol. Abstr. # 20446(1942).

\* Buntung, M.I.

The inheritance of color in bacteria, with special reference to Serratia marcescens. Cold Spring Harbor Symposia on Quanti-Biol. 11: 25-32, 1946. Biol. Abstr. # 21260 (1948).

\* Bunting, M.I.

Production of stable populations of color variants in aging broth cultures of Serratia marcescens 274.(Tabs). J. Bact. 40: 69-81, 1940.

\* Bunting, M.I.

A quantitative study of the dark-red to brightpink variation in Serratia marcescens. J. Bact. 39: 15, 1940.

\* Bunting, M.I.; and Ingraham, L.J Distribution of color variants in aging broth cultures of Serratia marcescens # 274. J. Bact. 43(5): 585-591, 1942. Biol. Abstr. # 20445, 1942. Bunting, M.I.; Labrum, E.L; and Hemmerly, Jean.

The effect of nutrition on the production and stability of an unstable white color-variant of the Hy strain of Serratia marcescens.

Amer. Naturalist 85: 331-332, 1951.

Chem. Abstr. # 7171h (1952).

Buonomini, G.

Research on variation in bacteria cultivated in association with tubercle bacilli; observations on a strain of B. prodigiosus. Atti. Accad. Fisiocrit Siena. (Studi d.fac. med. senese). 1: 375-383, 1933.

Daddi, G.

On variation in Bacillus prodigiosus. Boll. Soc. Internaz. Microbiol. Ital. 4: 377-379, 1932. Biol. Astr. # 6413, 1934.

Daddi, G.

Research on the variability of Bacillus prodigiosus. Boll. 1st Sieroterap. Milanese. 12: 597-617, 1933.

\* Kaplan, R.W.

Auslösung von Mutationen
durch sichtbares Licht im
vitalgefärbten Bacterium
prodigiosum. Naturwiss.
35(4): 127, 1948.
Biol. Abstr. # 123 (1951).

Kaplan, R.W.
Die Beeinflussung des
Mutationseffektes bei
Bacterium prodigiosum
durch dir Gas atomphare
während oder nach der
Bestrahlung mit kurzwelligerm Ultraviolet. Arch.
Pharm., Berlin. 23(2):
210-213, 1953.

\* Kaplan, R.W.

The mutagenic properties of ultraviolet irradiated nucleic acids. Naturwissenschaften. 40: 25, 1953. Chem. Abstr. # 11326f(1953).

\* Kaplan, R.W.

Mutations in bacterium

prodigiosum as a unimole
cular process. Zentr. Bakt.

Parasitenk. Abt.I.: 153,

129-133, 1949.

Chem. Abstr. # 3083h (1950).

Kaplan, R.W.

Mutationsauslösung bei Bacterium prodigiosum durch sichtbares Licht nach Vitalfärbung mit Erythrosin. Arch. Mikrobiol. 15: 152-175, 1950. Biol. Abstr. # 18534 (1952).

Kaplan, R.W.

Spontaneous stability of B. Prodigiosum. Zeit. Naturforsch. 2b(7/8): 308-312, 1947. Biol. Abstr. # 12779(1950).

### III. Variation

\* Labrum, E.L.; and Bunting, M.I. Spontaneous and induced color-variation of the Hy strain of Serratia mardescens. J. Bact. 65: 394-404, 1953. Biol. Abstr. #22727 (1953).

Lasseur, Ph.; Dupaix, A.;
Marchal, J.; and Combe, E.
Colorless variant of
B. prodigiosus. Is the
pigmentation dependent on a
physico-chemical factor?
Trav. Lab. Microbiol.Fac.
Pharm. Nancy. 4: 57-62, 1931.
Biol. Abstr. # 3923, (1933).

\* Reed, G.B.
Independent variation of several characteristics in Serratia marcescens. J. Bact. 34: 255-266, 1937.

Sangiorgi, G.
Effect of radium
emanations on microbial
dissociation phenomena.
Soc. Internaz. Microbiol.,
Boll. Sez. Ital. 5: 311312, 1933.

Velu, H.; and Balozet, L Rapid mutation of Bacillus prodigiosus produced agent of red stains: in salted provisions. Compt. rend. soc. biol. 100: 1095, 1929. Andreson, P.H.
Changes in fermenting properties of Bacillus prodigiosus. Hospitalstid. 63: 649, 1920.

Bach, D.; and Lambert, J.

Hydrogen donaters for

Monas prodigiosa. (Bacillus

prodigiosus). Compt. rend

soc. biol. 123: 358-361, 1936.

Bal, D.V.
Studies on carbon dioxide production in soil and solution. Ann. Appl. Biol. 13: 231-243, 1926.
Biol. Abstr. # 3171, 1927.

- \* Berencsi, G.
  Effect of d-xylose on
  gas metabolism of Bacillus
  prodigiosus cultured on
  silicate medium. Magyar
  orvosi arch. 41: 410-412,
  1940. Also: \*Biochem. Zeit.
  306: 150-152, 1940.
- \* Berencsi, G.; and Illenyi, A.
  Formation of cevitamic
  acid by Bacterium prodigiosum.
  Biochem. Zeit. 298: 298300, 1938.
  Biol. Abstr. # 4705,(1939).

Bergamini, L.

Mucolytic activity of certain microorganisms.
Boll. Ist. siersterap.,
Milan. 31: 448-452, 1952.
Chem. Abstr. # 4416a (1953).

- \* Berman, N.; and Rettger, L.F.

  Bacterial nutrition:
  further studies on the utilization of protein and non-protein nitrogen. J. Bact. 3: 367-388, 1918.
- # Burkholder, P.R.; McVeigh, I.; and Wilson, K.
  Studies on vitamin "Bc" produced by micro8rganisms.
  Arch. Biochem. 7(2): 287-303, 1945.
  Biol. Abstr. # 9892, 1946.
- \* Busch, G.

  Die engymatische Spaltung von 1 Asparagin
  durch Bacterien. Biochem.
  Zeit. 312(5/6): 308-314,
  1942.
  Biol. Abstr. # 943, 1946.
- \* Büsing, K.H.; and Peters, F.
  Ascorbic acid formation
  by B. prodigiosus from
  zylose. Biochem. Zeit. 304:
  134-136, 1940.

Chargaff, E.
The Nucleic acids of
microërganisms. 2nd Congr.
internat. biochem., Chim.
biol., V, Symposium sur le
métabolisme microbien.
(Paris) 41-46, 1952. (in Engl.)
Chem. Abstr. # 4953g (1953)

\* Crichton, P.C.; and Lazerus, A.S.
Relationship between
prodigiosin production and
catallase activity. J. Bact.
56: 375-377, 1948.

\* Davis, D.J.

Food accessory factors (vitamins) in bacterial culture. II. J. Infectious Diseases. 23: 248-251, 1918.

Dernby, K.G.

On certain extracellular bacterial proteases. Biochem. Zeit. 126: 105-108, 1921-1922. Abstr. Bact. # 270 (1923).

\* Diehl, H.S.

The specicity of bacterial proteolytic enzymes and their formation.

J. Infectious Diseases. 24: 347-361, 1919.

Euler, H.V.

Enzymatic nitrogen metabolism. Arkiv. Kemi. Minerol. och Geol. 9(4, paper 47): 1-6, 1928. Biol. Abstr. # 6910 (1935).

- \* Follis, R.H.; and Burnett, J.M.

  Effect of specific antibody on the metabolism of
  Serratia marcescnes. Proc.
  Soc. Exp. Biol. Med. 75(1):
  206-208, 1950.
- \* Fredericq, P.
  Coagulation of oxalated plasma by cultures of B. prodigiosus. Compt. rend. soc. biol. 140: 1132-1133, 1946.

Giolitti, G.

Ricerche sperimentali sulla catalasi nei microroganismi (variazioni sperimentali del contenuto in catalasi in Serratia marcescens Bizio).
Rivista de Biologia (Perugia) 41(1): 41-62, 1949.
Biol. Abstr. # 8824, 1954.

Gorini, C.

The chymase of Bacterium prodigiosum. Boll. soc. Ital. biol. sperim. 5(4): 517-518, 1930.

Gorini, C.

Enzimi microbici abituali. Rend. R.1st Lombardo. 73: 475, 1940. Biol. Abstr. # 11055 (1941).

\* Gorini, C.

Renin (chymase) production by Bacillus prodigiosus. J. Bact. 20: 297-298, 1930.

Hayashi, Shigeru

Experimental investigation of the steric relations
in the transformation of
phenylglyoxal hydrate by
various bacteria.
Biochem. Zeit. 206: 223-227,
1929.
Biol. Abstr. # 25253 (1930).

\* Hes, J.W.

Function of carbon dioxide in metabolism of hetero-tropic cells.
Nature 141: 647, 1938.

Hietaranta, M.; and Cyllenberg, H.

The role of growth of bacteria and oxidation-reduction potential on the origin of biacetyl and acetoin in milk.

Svenska Mejeritidn. 42: 217-220; 227-229, 1950.

- \* Illenyi, A.

  Über die antagonistische Wirkung von Paraaminobenzolsulfamid und Xylose
  auf Grund von Bacterienstoffwechselexperimenten.
  BioChem. Zeit. 311(1/3):
  24-28, 1942.
  Biol. Abstr. # 19970,(1946)
- \* Illenyi, A.; and Berencsi, G.
  The action of xylose on
  gas metabolism of bacteria.
  Biochem. Zeit. 298: 301-306,
  1938.
- \* Illenyi, A.; and Berencsi, G.
  Metabolism of Bacterium
  prodigiosum on culture medium containing carbohydrate
  and protein. Biochem. Zeit.
  297(1/2)46-51, 1938.
  Biol. Abstr. # 14553 (1938).

Imaizumi, M.
Bacterial enzymes. J. Biochem. (Japan). 27: 45-64, 1938.

Imaizumi, M.
 Bacterial enzymes; prodigiosus proteases. J. Biochem.
(Japan) 27: 213--225, 1938.

Imaizumi, M.
Bacterial enzymes. III.
Bacterial acylase. J. Biochem. (Japan). 27: 199211, 1938.

Janke, A.; and Holzer, H.
Probleme des Stickstoffkreislaufs. II.
Weitere Untersuchungen
über das proteolytische
Vermogen der Mikroben.
Biochem. Zeit. 226:
243-249, 1930.
Biol. Abstr. # 6550, 1932.

Jensen, H.L.; and Petersen, H.
Decomposition of hormone
herbicide by bacteria.
Acta Agr. Scand. 2: 215231, 1952.
Chem. Abstr. # 6592h (1953).

Kimura, H.
Formation of optically active lactic acid from glucose and di-lactic acid by bacteria. Acta Scholae.
Med. Kioto. 11: 325-333, 1928.
Biol. Abstr. # 22137, (1930).

Kodama, Keishun.

Biological studies on
bacilli in the intestines. III.
Oxygen respiration of Bacillus
prodigiosus. J. Gastroenterol.
5: 966-980, 1930.
Biol. Abstr. # 22625, 1932.

\* Koser, S.A.; and Baird, G.R.

Bacterial destruction of nicotinic acid. J. Infectious Diseases. 75(3): 250-261, 1944. Biol. Abstr. # 6792 (1945).

\* Koser, S.A.; and Rettger, L.F.
Studies on bacterial
nutrition. The utilization
of nitrogenous compounds of
definite chemical composition
J. Infectious Diseases. 24:
301-321, 1919.

Kraay, G.M.; and Wolff, L.K.
The splitting of lipoids
by bacteria. Proc. Acad. Sci.
Amsterdam. 26: 436-437, 1923.
Abstr. Bact. # 1640 (1925).

Lasseur, Ph.; Dupaix-Lasseur, A; and Gavoille, M. Th.

Etude des suspensions bacteriennes. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 12: 11-23, 1939-1941. Biol. Abstr. # 958 (1946).

Launoy, L.

The antagonistic action of the serum of certain mammals upon bacterial proteases. Ann. Inst. Past. 33: 657-677, 1919. Abstr. Bact. # 2087 (1919).

Launoy, L.

The antagnonistic action of blood serum and bacterial proteases. Compt. rend. soc. biol. 82: 57-59, 1919.

Lamoigne, M.
The butylene-glycollic fermentation of saccharose by organisms of the B. prodigiosus group. Compt. rend. soc. biol. 82: 234-236, 1919. Abstr. Bact. # 451 (1919).

Lieben, F.; and Lowe, L.
The breakdown of glucose,
fructose and glucosamin by
bacteria. Biochem. Zeit.
252: 70773, 1932.
Biol. Abstr. # 4138 (1934).

- \* McLean, D.J.; and Fisher, K.C.
  Extra oxygen consumed
  during growth of Serratia
  marcescens as a function
  of the carbon and nitrogen
  sources and of temperature.
  ( tabs., graphs). J. Bact.
  58: 417-428, 1949.
  Biol. Abstr. # 1996 (1950).
- \* McLean, D.J.; and Fisher, K.C.

  The relation between
  oxygen consumption and the
  utilization of ammonia for
  growth in Serratia marcescens.
  J. Bact. 54(5)L 599-607, 1947.
  Biol. Abstr. # 16604, (1948)
- \* McLean, D.J.; and Purdie, E.F.

  Effect of amino acids,
  purines, and pyrimidines on
  carbon dioxide fixation by
  Serratia marcescens.
  J. Biol. Chem. 197: 539545, 1952.
  Biol. Abstr. # 1509 (1953).

- \* McLean, D.J.; Purdie, E.F.; and Robinson. N.H. Carbon dioxide fixation in relation to growth of Serratia marcescens. Fed. Proc. 10(1): 220, 1951. Biol. Abstr. # 28116 (1951).
- \* McLean, D.J.; Robinson, N.H.; and Purdie, E.F. Influence of metabolic state and of medium on carbon dioxide fixation by Serratia marcescens. J. Bact. 61: 617-626, 1951.
- \* McLean, D.J.; Robinson, N.H.; and Purdie, E.F. Relation between carbon dioxide production and utilization of ammonia for growth in Serratia marcescens. J. Bact. 62: 231-234, 1951.
- \* Maschmann, Ernst.

  Bacterial proteases. I.

  Biochem, Zeit. 294: 1-33,
  1937.
- \* Maschmann, E.
  Proteinase of B. prodigiosus, B. pyocyaneus and B. fluorescens liquefaciens. Zentr.
  Bakt. Parasitenk. Abt. I.
  128: 288-293, 1937.
- \* Moycho, W.

  Independence of protease production and of cellular development. Compt.rend. 202:.2007-2009, 1936.

Moycho, Waclaw.

The protease of Bacterium prodigiosum. \*\*Cta. Acta.

Soc. Botan. Polon. 10: 417-440, 1933.

Biol. Abstr. # 11446 (1936).

- \* Neish, A.C.
  Studies on the anaerobic dissimulation of glucose by Bacillus substilis (Ford's type). Canadian J. Bot. 31(3): 265-276, 1953.
  Biol. Abstr. # 32471 (1953).
- \* Neish, A.C.; Blackwood, A.C.; Robertson, F.M.; and Ledingham, G. Production and properties of 2,3- butanediol. XVIII. Dissimulation of glucose by Serratia marcescens. Canadian J. Res., Sect. B. Chem. Sc. 25(1): 65-69, 1947. Biol. Abstr. # 17813 (1947).
- \* Neish, A.C.; Ledingham, G.A.
  Production and properties
  of 2, 3-butanediol XXXII. 2,3Butanediol.fermentations at
  poised hydrogen ion concentrations. Canadian J. Res.
  Sect. B., Chem. Sci. 27(8):
  694-704, 1949.
  Biol. Abstr. # 2251 (1950).

Nilsson, R.; Alm, F.; and Burström, D.

Manganese as a substitute for malgnesium in metabolism and anabolism of the cell. Arch. Mikrobiol. 12(3/4): 353, 1942. Biol. Abstr. # 7324 (1945).

## Nisimura, K.

1-tyrosine-aplitting capacity of pyocyaneus and prodigiosus bacilli. Nagasaki Igakkai Zassi. 17: 2162, 1939.

\* Bederson, C.S.; and Breed, R.S.

The fermentation of glucose
by bacteria of the genus
Serratia. J. Bact. 15: 1011, 1928.

Rotini, C.T.
Rennets of animal and vegetable origin. Intern.
Dairy Congr., Proc. 13th (Hague) 3: 1406-1409, 1953.
Chem. Abstr. # 11592d (1953).

\* Ruska, H.
Formed metabolic products of Chromobacterium prodiguism. Zeit. Hyg. Infektionshrankh. 123: 289-293, 1941.

Saba, Bruno.
Indophenol oxidase in
microërganisms. Atti. soc.
ital. sci. vet. 3: 553559, 1949.
Chem. Abstr. # 5136d (1952).

Schieblich, M.
On the formation of
vitamin B by Bacillus
Ellenbachensis Stutzer and
Bacterium prodigiosum.
Biochem. Zeit. 233: 371-374,
1931.
Biol. Abstr. # 13826 (1932).

\* Schollmeyer, J.

Influence of papainactivating substances on
splitting of gelatin by

bacteria. Zentr. Bakt. Parasitenk. Abt. I., Orig. 142: 256-268. 1938.

\* Silliker, J.H.; and Rittenberg.SC
Aerobic oxidation of fatty
acids by bacteria; application
of technic of simultaneous
adaptation to study of mechanism of fatty acid oxidation
in Serratia marcescens.
J. Bact. 61: 661-673, 1951.

\* Silliker, J.H.; and Rittenberg, S.C.

The aerobic oxidation of fatty acids by bacteria. Effect of 2,4-dinitrophenol (DNP) on oxidation of fatty acids by Serratia marcescans. J. Bact. 64: 197-205, 1952. Chem. Abstr. # 1029le (1952).

\* Silliker, J.H.; and Rittenberg, S.C.
Studies on the aerobic oxidation of fatty enzymes, constitutive or adaptive.
J. Bact. 61(6): 653-659, 1951.
Biol. Abstr. # 1373, 1952.

\* Silliker, J.H.; and Rittenberg, S.C.

Studies on the aerobic oxidation of fatty acids by bacteria. II. Application of technique of simultaneous adaptation to the study of the mechanism of fatty acid oxidation in S.m. J. Bact. 61(6): 661-673, 1951. Bio. Abstr. # 36988 (1951).

- \* Silliker, J.H.; and Rittenberg, S.C.
  - Studies on the aerobic oxidation of fatty acids by bacteria. III. The effect of 2,4-dinitrophenol on the oxidation of fatty acids by Serratia marcescens.

    J. Bact. 64(20): 197-205, 1952.
    Biol. Abstr. # 1521 (1953).
- \* Stone, R.W.; and Werkman, C.H.

  The occurrence of phosphoglyceric acid in the
  bacterial dissimilation of
  glucose. Biochem. J. 31:
  1516-1523, 1937.
- \* Sturges, W.S.; and Rettger, L.F.
  Bacterial autolysis. J. Bact.
  7: 551-557, 1922.
  - Swiatopelk-Zawadski.
    Investigations on protease
    of the milk bacteria. Zeit.
    Untersuch. uNahr.-u.-Genussmitt. 32: 161-170, 1916.
    Abstr. Bact. # 1893 (1918).
- \* Tarr, H.L.A.
  The enzymic formation of hydrogen sulphide by certain heterotrophic bacteria.
  Biochem. J. 27: 1869-1874, 1933.
- \* Tarr, H.L.A.

  The enzymic formation of hydrogen sulphide by certain heterotropic bacteria.
  Biochem. J. 28: 192-198, 1934.

- Thompson, R.C.

  Synthesis of B vitamin
  by bacteria in pure culture.
  Univ. Texas Pub. No. 4237,
  87-96, 1942.
  Chem. Abstr. # 1459, 1942.
- \* Wahlin, J.G.
  Study of rennin action;
  rennin production of Bacillus
  prodigiosus. J. Bact. 16:
  355-373, 1928.
- \* Waring, W.S.; and Werkman, C.H.

  Iron requirements of hetrotrophic bacteria. Arch. Biochem. 1(3): 425-433, 1943.
  Biol. Abstr. # 18650, 1943.
- \* Zamenhor, S.; Brawerman, G.; and Chargaff, E.B.

  The deoxypentosenuclei acids from several micro-brganisms. Biochim. et Biophys. Acta 9: 402-405, 1952.
  Chem. Abstr. # 2268a (1953).

\* Alha, A.K.

Studies on the relative resistance of germs to the salts of group I of periodic table. Acta Path. Microbiol. Scand., Suppl. # 65: 1-74, 1946.

\* Amako, T.H.

Effect of immune serum on the vital phenomena of bacteria. Zentr. Bakt. Parasitenk. Abt. I., Orig. 116: 506-516, 1930. Biol. Abstr. # 17810 (1931).

Amako, T.H.

Influence of immunsera on the life processes of bacteria. Fukuika Acta Med. 21: 321-364, 1928. (German Summary, p.16-17). Biol. Abstr. # 18712, 1930.

\* Amster, S.; and Meyer, P.S.
Action of astringents on
photosensitivity of Bacillus
prodigiosus. Klin. Woch.
3: 2098-2099, 1924.
J. Amer. Med. Assoc. 84:
71, 1925.

Arloing, F.; and Thevenot, L.
Attempts at anaphylaxis
in bacteria. Modifications
produced by abrupt passages
in bouillon containing serum
in different concentrations.
Compt. rend. soc. biol. 87:
12-14, 1922.
Abstr. Bact. # 1057 (1922).

\* Beguet, M.
Action de quelques
antibiotiques sur divers
types de B. prodigiosus
issus de la meme souche.
Ann. inst. Pasteur. 85:

\* Béguet, M.

394-396, 1953.

Effect of some antibiotics on different types of Bacillus prodigiosus originated from the same strain. Ann. inst. Pasteur. (Paris). 85(3): 394-396, 1953.

Binstock, Harold
The effects of cations
upon bacterial viability.
Bull. Univ. Pittsburgh.
41(4): 32-37, 1945.
Biol. Abstr. 3 22034, 1945.

Brodersen, R.; and Kjaer, A.
The antibacterial action
and toxicity of some unsaturated lactones. Acta Pharmacol. et Toxicol. 2(2):
109-120, 1946.
Biol. Abstr. # 1249, 1947.

\* Churchman, J.W.

Resistance of Bacillus prodigiosus to aniline dyes. Proc. Soc. Exper.
Biol. Med. 28: 647-648, 1931.

\* Bonetti, E.; and Illenyi, A.
The influence of colonicine on the bacterial metabolism.
Zentr. Bakt. Parasitenk. Abt. I,,
Orig. 148: 114-117, 1941.
Biol. Abstr. # 3570 (1947).

Churchman, J.W.

The mechanism of bacteriostasis. Proc. Soc. Exper.
Biol. Med. 20: 16-18, 1922-1923.

\* Day, G.M.
The influence of earth—
worms on soil microorganisms.
Soil Sci. 69(3): 175-184,
1950.
Biol. Abstr. # 24509 (1950).

De Graaff, W.C.

The influence of fatty oils on bacteria contained therin. Tijdschr. v. Vergel-ijk. Geneesk. 6: 22-32, 1920.
Abstr. Bact. # 1323 (1922).

\* Dold, H.
Die inhibition (Keimvermehrungshemmung) als. Abwehrmittel de normal Schleimhaut
gegen Infektion. Zeit. Hyg.
Infektionskrankh. 124(6):
597-605, 1943.
Biol. Abstr. # 22065 (1945).

\* Dold, H.
Vital inhibition und
inhibitions immunitäl.
Zeit. Immunitätsforsch.
107(1/2): 196-205,1950.
Biol. Abstr. # 33187 (1950).

\* Dold, H.; and Knapp, A.

The antibacterial action
of spices. Zeit. Hyg. Infektionshrankh. 128: 696-706,
1948.
Chem. Abstr. # 9419b(1953).

Dresner, E.
The toxic effect of
Beaveria bassiana. J. N.Y.
Ent. Soc. 58(4): 269-278,
1950.
Biol. Abstr. # 25645 (1951).

\* Eisler, M.; and Jacobsohn, I.
Antagonistic action of
sterile bouillon extracts on
B. prodigiosus. Zeit. Hyg.
Infektionskrankh. 117: 7691, 1935.
Biol. Abstr. # 3687 (1936).

Ellinger, P.H.; and Gruhn, E. Uber die Verstärkung der Röntgenstrahlenwirkung durch Sekundärstrahlung. Strahlentherapie. 38: 58-97, 1930. Biol. Abstr. # 299 (1932).

Fischer, R.

pH and the adaptation of bacteria against quarternary ammonium disinfectants.

Mfgs. Chemist. 24: 195-196, 1953.

Chem. Abstr. # 9408e (1953).

\* Fischer, R.; and Larose, P.
Factors governing the
adaptation of bacteria
against quarternaries.
Nature 170: 715-716, 1952.
Chem. Abstr. # 3406b(1953).

- \* Follis, R.H.; and Burnett, J.M.

  Effect of specific antibody
  on the metabolism of Serratia
  marcescens. Proc. Soc. Exper.
  Biol. Med. 75(1): 206-208,
  1950.
- \* Follis, R.H. Jr.; Burnet, J.M.; and Laschever, Z.E.

  The effect of specific antibody on the oxygen consumption and growth of S. marcescens, S. typosa, and Sh. paradysenteriae. Bull. Johns Hopkins Hosp. 91: 463-474, 1952.
  Bull. Byg. 28: 1084, 1953.

Friedberger, E.
The behavior of the virus of bird pox toward various disinfectants together with investigations on the nature of the disease. Zeit. Immunit%tsforsch. u. exper. Therap. 27: 459-468, 1918.
Abstr. Bict. # 546, 1919.

Friedberger, E.
The disinfection of invisible viruses. Reit.
Immunitation for the Association of the Associa

\* Germanical, but and Within, B.

Loder but compounds and
there and the terms lottly ty.
Amer. J. Phair List 157-169.
1549.

Grün, L.

Beitrag zur Wirkungsweise des Triaethylene
Glycol. Arch. Hyg. Bákt.
134(4): 237-244, 1951.

Hansren, Arthur.
The bactericidal
power of the stomach and
some factors which influence
it. Amer. J. Digest. Dis.
and Nutr. I: 725-727, 1934.
Biol. Abrtr. # 3349 (1936).

Hellit, 1.
Studies on the self-disinfecting power of the skin. Ann. Not. Exptl. et 1901. Fem., 26(Suppl. 3): 1-90, 1943.
Biol. Abstr. #14593 (1950).

Jakob, A.; and Mahl, H.
Addorption of metal
colloid on bicteria.
Zeit. Miturforsch. 3b:
9, 1943.
Kelleid-Zeit. 119: 42-45,
19.5.

\* K whi, hutsayaki.

On influence of glucosides on streptococcus and other microfrganisms. Jap. J. Exp. Med. 18(2): 9:-103; 1940.

brol. Abstr. # 4910; 1942.

Keyuma, D.

Antibacterial and antitexic action of ille. Proc. Japanese Bact. Sec. 1911.
Abstr. Bact. # 1780, 1918.

La Grutta, L.

Effect of methylcholanthrene on development of Serratia marcescens. Rassegna med. sarda. 49: 42-47. 1947.

Lasseur, Ph.; Dupaix, A.; and Dombray. P.

Study on the mechanism of precipitation of suspensions of B, prodigiosus by hydrogen ions. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 4: 211-216, 1931. Biol. Abstr. # 3929 (1933).

Lasseur, Ph.; Dupaix-Lasseur, A.; and Moulin, A.

Action of surface-active substances on the colony form of dissociated types of B. aurantiacus tingitanus, B.prodigiosus and B. chlororaphis.

Trav. Lab. Microbiol Fac. Pharm.
Nancy. 11: 23-25, 1938.

Lasseur, Ph.; Dupaix-Lasseur, A.; Pepin, J.; Leveque, M.Th.; Girard, Th. and Aubert, J.

Penicillin. Effect on Serratia marcescens. Trav. Lab. Microbiol. Faculte Pharm. Nancy. No. 14: 68-96, 1945.

Lasseur, Ph.; and Laroche, G.
Resistance of different
dissociated types to the
action of phenol. Trav. Lab.
Microbiol. Fac. Pharm. Nancy.
11: 39-40. 1938.
Biol. Abstr. # 5124,(1940).

Lutsky, I.L.; and Bell, A.E.
Antibacterial action of
egg albumin in embryonic
immunity. Poultry Sci.
32: 285-293, 1953.
Chem. Abstr. # 10613c (1953).

\* Marchal, J.G.; and Girard, Th.
Oxidation-reduction phenomena evidenced by growing bacteria in presence of ammonium molybdate. Comp. rend. soc. biol. 141: 118-119, 1947.

Meier, Rolf.

Zur Frage der Bakterienchemotaxine. Helvetica Chim. Acta 24(Suppl.) 134F-140F, 1942. Biol. Abstr. " 22532 (1942).

Ozek, Omer.

Sarimsagin bakteriler dzerindeki etkinsi hakkinda. (The effect of garlic on bacteria). Istanbul. Seririyati 27: 156-161, 1946. Biol. Abstr. # 25379 (1947).

\* Politi, I.; Cola, C.; and Benetti, R.

Mesearches on antibacterial activity of some amino acids. Ann. Microbiol. 4(1): 1-6, 1948. Biol. Abstr. # 1974 (1951).

Rodrigues, C.; e Guida, V.O.
Toxinogenese tetanica em
culturas associadac. Arq. Inst.
Biol.(Sao Paulo). 16: 193216, 1945.
Biol. Abstr. # 20058, 1947.

# V. Effects of Chemical Agents on Serratia Marcescens

Rouquier, A.; and Tricoire, R.
The action of ether on
bacteria, pathogenic and nonpathogenic for non-pathogenic
for man. Compt. rend. soc.
biol. 82: 1160, 1919.
Abstr. Bact. # 215, 1920.

Further contribution to the study of mechanism of action on arsphenamine. Research on the bactericidal power in vitro against B. pyocyaneum, B. prodigiosus and B. coli. Gior. Bibteriol. Immunol. 14: 1269-1280, 1935.

Takase, Akira.

Antibiotic action of pyroligenous acid on some aerobic saprophytes. Bull.

Japan. Soc. Sci. Fisheries.

16: 244-246, 1950.

Chem. Abstr. # 8176i (1953).

The effect of magnesium on the growth of butteria in chemically defined media of

chemically defined media of varying complexity. J. Gen. Kicrobiol. 5: 485-495, 1951. Chem. Abstr. # 682f (1953).

Winkler, K.C.

On the action of sulfanil - amide. IX. J. Microbiol. Serol. 9(3/4): 115-128, 1943. Biol. Abstr. # 6317, 1947.

# Bortels, H.

Uber bezichungen zwischen epidemiologischem und meteorologischem Geschechen, unter besonderer experimenteller Berucksichtigung der Inhibinwirkung. Zentr. Bakt. II. Abt. 104(17/22): 285-325, 1942. Biol. Abstr. # 16608,(1943).

Burge, W.E. The mode of action of ultra-violet radiation in producing sterilization. Pure Products. 13: 114, 1917. Abstr. Bact. # 647, 1917.

- \* Cicconi, M. Peculiar sensitivity to cold of agar cultures of Bacillus prodigiosus and .Bacillus pyocyaneus; possible relation to alcohol and phenol sensitivity. Zentr. Bakt. Parasitenk. Abt.I., Orig. 148: 147-154, 1941.
- \* Cicconi, M. A special sensitivity to cold of cultures of B. prodigiosus and B. pyocyaneus on agar slopes. Zentr. Bakt. Parasitenk, Abt.I, Orig. 148: 147-154, 1941. Biol. Abstr. # 3572 (1947).

- \* Fowle, A.C.; and Fisher, K.C. Browth and 05 consumption as affected by x-irradiation, using the bacterium, Serratia marcescens. Fed. Proc. 8(1): 50, 1949. An abstract. Biol. Abstr. # 12772(1950).
- # Fram, H.; Proctor, B.E.; and Dunn, C. Effects of x-rays produced at 50 kilovolts on different species of bacteria. I. Bact. 60(3): 263-267, 1950. Biol. Abstr. # 36603(1950).
- \* Füchtbauer, H.; and Theisman, H. Zur wirkung des Ultraschalls auf Bakterien. Naturwiss. 36(11): 346-347, 1949. Biol. Abstr. 25, # 5366 (1951).
- \* Goncharov, G.D. Effect of infrared rays on micro8rganisms. Microbiol.(U.S.S.R.) 8: 93-99, 1939.

Haberman, Sol. Lethal and dissociate effects of X-rays on bacteria. Ohio State Univ. Abstr. of Doctoral Dissertations. 26: 135-146, 1941 (1942). Biol. Abstr. # 16356 (1943).

Holweck, F.; and Lacassagne, A. Study of sensitivity of B. prodigiosus to weak roentgen rays. Compt. rend. soc. biol. 100: 1101-1103, 1929.

## VI. Effects of Physical Agents on Serratia Marcescens

Lasseur, Ph.; Dupaix-Lasseur, A.; and Dombray, P.

Observations on the phenomenon of Charrin and Roger. XLV.
Agglutination of suspensions subjected to fractional centrifugation. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 8: 81-91, 1935.
Biol. Abstr. # 8924 (1937).

Lasseur, Ph.; Dupaix-Lasseur, A.; et Escal. F.

Influence des variations experimentales de la tension superficielle des cultures des differents types dissocies de quelques bactéries chromogenes. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 13: 148-152, 1942-1944. Biol. Abstr. # 967 (1946).

Lasseur, Ph.; Florentin, P.; Jacob, P.; Dupaix-Lasseur, M.; Gavoille, Th.; Melcion, J.; et Giabicani, R.

Action des radiations ionisantes sur les bactéries. Trav. Lab. Microbiel. Fac. Pharm. Nancy. 13: 274-283, 1942-1944. Biol. Abstr. # 976 (1946).

\* Ledermann, K.J.; and Neger, P.J.
Increase of reaction against irradiation through previous irradiation. Klin. Woch. 5: 1460-1464, 1926.
Biol. Abstr. # 11564 (1927).

Marchal, J.G.; Girard, Th.; and Nicot, R.

Contribution à l'étude de l'electrolyse en courant alternatif des suspension bacteriennes en eau bidistillée. Trav. Lab. Hicrobiol. Fac. Pharm. Nancy. 16: 114-127, 1948-1949. Biol. Abstr. # 17583 (1951).

Marconi, E.

Mitogenetic radiations of human blood with Micrococcus prodigiosus as detector. Pathologica. 23: (31,-688, 1931.

- \* Meyer, P.S.

  Acquired resistance of Bacillus prodigionus against roentgen rays.

  Klin. Woch. 2: 297-299, 1923.

  J. Amer. Ned. Assoc. 80: 1656, 1923.

  Abstr. Bact. # 1473 (1923).
- F Meyer, P.S.

  Irradiation of prodigiosus. Klin. Woch. 2:
  11/16-11/17, 1930. J. Amor.
  Med. Assoc. 21: 1731, 1923.
- \* Naylor, H.B.; and Smith, P.A.
  Factors affecting the viability of Serratia marcescens during dehydration and storage. J. Bact. 52(5): 565-573, 1946. Biol. Abstr. # 9132 (1947).

Pistelli, F.
Filtration and ultrafiltration of Bacillus
prodigiosus.
Ann. igiene. 42: 385391, 1932.

\* Stein, C.D.; and Rogers, H.
Recovery of viable
microorganisms and viruses
from vapors removed from
frozen suspensions of
biologic material during
lyphilization. Amer. J.
Vet. Res. 11(40): 339344, 1950.
Biol. Abstr. # 2280(1951).

Stille, Bernd.
Untersuchungen über den Kältetod von Mikroorganismen.
Arch. Microbiol. 14: 554-587, 1950.
Biol. Abstr. # 12403 (1952)

Tanner, R.W.; ans Windsor, M.F.

The ability of Escherichia coli and Serratia marcescnes to survie 62.8 °C. for thirty minutes in milk.

J. Dairy Sci. 12: 202-210, 1929.

Biol. Abstr. # 12403 (1930).

-2::-

Trillat, Jean-Jacques.

Action of x-rays of great wave length on microorganisms (case of B. prodigiosus). Compt.
rend. 183: 614-616, 1926.
Biol. Abstr. # 12756 (1927).

# Theisman, H.; and Wall-hadse, K.H.

Elektronenmikroskop-ische Beobachtungen an beschallten Bakterien.
Naturwiss. 37(8):
105-186, 1950.
Biol. Abstr. # 5381 (1951).

Trillat, Jean-Jacques.

Secondary action of x-rays on microorganisms.

Compt. rend. 183: 1304-1307, 1926.

Biol. Abstr. # 2279 (1926).

#### VII. VIABILTYY

Bozhenko, V.P.

Time of conservation of Bacterium prodigiosum in body of mosquito, Culex apicalis. Vestnik. Mikr. Epidemiol. Parazitol. 15: 439-444, 1936.

\* Cicconi, M.
Peculiar sensitivity
to cold agar cultures of
Bacillus prodigiosus and
Bacillus pyocyaneus;
possible relation to
alcohol and phenol sensistivity. Zentr. Bakt.
Parasitenk. Abt. I., Orig.
148: 147-154, 1941.
Biol. Abstr. # 3572 (1947).

- \* Deacon, W.E.
  Longevity of Serratia
  marcescens. Science. 76:
  274, 1932.
- \* Fowle, A.C.; and Fisher, K.C. Growth of O consumption, as affected by \*\*rradiation, using the bacterium, Serratia marcescens. Fed. Proc. 8(1): 50, 1949. (An abstract.) Biol. Abstr. " 12772 (1950).
- \* Fram, H.; Proctor, B.E.; and Dunn, C. Effects of x-rays produced at 50 kilovolts on different species of bacteria. J. Bact. 60(3): 263-267, 1950. Biol. Abstr. # 36603 (1950).

\* Ledermann, K.G.; and Meyer, P.S.

Increase of reaction
against irridation through
previous irradiation. Klin.
Woch. 5: 1462-1464, 1926.
Biol. Abstr. # 11564(1927).

\* Meyer, P.S.

Acquired resistance of
Bacillus prodigiosus against
roentgen rays. Klin. Woch.
2: 297-299, 1923.

\* J. Amer. Med. Assoc. 80:

1656, 1923. Abstr. Bact. # 1473 (1923).

Nagypal, I.

The sensitivity to pH and the effect on the keeping quality of butter of some microorganisms which occur in sour cream butter. (With Germ. Summary). Thesis: Univ. Budapest. 1938. Biol. Abstr. # 22347 (1941).

Tanner, R.W.; and Windsor, M.F.
The ability of escherichia coli and Serratia marcescens to survive 62.8° C. for thirty minutes in milk.
J. Dairy Sci. 12: 202-210, 1929.
Biol. Abstr. # 12408 (1930).

- \* Amako, T.H.
  Production of pigments
  in Bacillus prodigiosus.
  Zentr. Bakt. Parasitenk.
  Abt. I. Orig. 116: 494-505,
  1930.
  Biol. Abstr. # 20857 (1931).
- \* Beguet, M.
  Conditions influencing appearance of pigment in cultures of Bacillus prodigiosus. Compt. rend. soc. biol. 98: 837-939, 1928.
- \* Bunting, M.I.; Robinow, C.F.; and Bunting, H. Factors affecting elaboration of pigment and polysaccharide by Serratia marcescens. J. Bact. 58: 114-115, 1949.
- \* Fischer, H.; und Gangl, K.

  Synthese eines Tripyrrylmethens und eines Dipyrropyrons, ein Beitrag zur Konstitution des Prodigiosins.
  Hoppe-Seyler's Zeit. Physiol.
  Ohem. 267(4/5): 201-209, 1941.
  Biol. Abstr. # 9970 (1942).

Fukumoto, K.
Pigment production of
Bacillus pyocyaneus and
Bacillus prodigiosus on
agar media composed of
mackerel or bean-cake.
J. orient. Med. 21: 17,
1934.

Giolitti, Giovanni.

Pigmentation, peroxidase, and catalase in
Serratia marcescens in
relation to anaerobic
experiments. Boll.
soc. ital. biol. sper.
24: 812-814, 1948.
Chem. Abstr. # 1561f (1950).

- \* Goldsworthy, N.E.; and Still, J.L.

  Effect of meat extracts
  and other substances upon
  pigment production. J. Path.
  Bact. 43: 555-564, 1936.
- \* Goldsworthy, N,E.; and Still, J.L.

  Effect of various meat extracts on pigment production in B. prodigiosus. J. Path. Bact. 46: 634-635, 1938.
  - Gorbach, C.
    Optical behavior of prodigiosin, red pigment of Bacillus prodigiosus.
    Arch. Mikrobiol. 1: 368-380, 1930.
- \* Gorbach, G.
  Study of pigment of
  Bacillus prodigiosus;
  formation of the pigment.
  Zentr. Bakt. Parasitenk.
  Abt.II. 79: 26-50, 1929.
- \* Hubbard, R.; and Rimington, C.
  Biosynthesis of prodigiosium. Biochem. J. 46(2):
  220-225, 1950.
  Biol. Abstr. # 36633 (1950).

## VIII. Prodigiosin: Factors Affecting Pigmentation

Imsenecki, A.I.
Biological role of
bacterial pigments.
Compt. rend.acad. sci.
U.H.S.S. 53: 467-469, 1946.

\* Kharasch, M.S.; Conway, E.A.; and Bloom, W.

Some chemical factors influencing growth and pigmentation of certain microorganisms. J. Bact. 32: 533-540, 1936.

Kodama, Kaishun.

Biological studies on the bacilli living in the intestines. I. General properties of the pigment produced by Bacillus prodigiosus. II. Physicochemical influences upon the pigment formation by Bacillus prodigioses. J. Gastroenterol. 4(4): 557-570: 5: 686-700, 1929. (In Japanese). Biol. Abstr. # 22624 (1932).

Kost, P.F.
The effect of temperature, inorganic salts, and amino acids on morphology and pigment production of Serratia marcescens. Bull. Pittsburgh Univ. 38(2): 258-265, 1942.

Biol. Abstr. # 14904 (1942).

Kreitlow, K.W.

Some effects of visible radiation on pigmentation of Serratia marcescens. J. Bact. 42(1): 127-132, 1941. Biol. Abstr. # 18986 (1941).

Kwapinski, J.; and
Pietraszkiewiczowa, H.
Effect of phenanthrene
alkaloids on variation
of pigment production by
Pseudomonas aeruginosa
and Serratia marcescens.
Med. dosw. mikrob. 5(2):
159-164, 1953.

Kwapiński, J.; and Pietraszkiewicz, H.

Variations in pigment production by Pseudomonas aeruginosa and Serratia marcescens under the influence of phenanthrene alkaloids.

Med. dosw. mikrob. 5:159-164, 1953.
Chem. Biol. # 8185b (1953).

Lasseur, Ph.; Combe, E.; and Dupaix, A.

Influence of iron on the production of prodigiosin. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 4: 45-55, 1931. Biol. Abstr. # 3922 (1933).

Lasseur, Ph.; Dombray, P.; and Dupaix, A.

Relation between hydrogen ion concentration of the culture media, growth and bacterial. chromogenesis. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 4: 13-30, 1931. Biol. Abstr. # 3921 (1933).

Lasseur, Ph.; Dupaix-Lasseur, A. and Moulin. A.

Relation between pH of medium L<sub>1</sub> and chromogenesis of bacteria of prodigiosus group. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 10:11-22, 1937.

Lasseur, Ph.; and Georges, H.
Role of glycerol in
production of prodigiosin.
Trav. Lab. Microbiol. Fac.
Pharm. Nancy. 9: 47-48,
1936.

Lasseur, Ph.; et Melcion, J.

Le fer et le manganese
dans la production de
prodigiosine. Trav. Lab.
Microbiol. Fac. Pharm. Nancy.
13: 192-203, 19/42-19/4/4.
Biol. Abstr. # 971 (1946).

Lasseur, Ph.; Vernier, P.;
Dupaix, A.; and Combe, E.
Action of hydrogen ions
on suspensions of B. prodigiosus. Adsorption of
hydrogen ions on bacterial
chromatophores. Distribution and occurrence of
prodigiosin. Trav. Lab.
Microbiol. Fac. Pharm.
Nancy. 4: 73-83, 1931.
Biol. Abstr. # 3925 (1933).

Linnare, A.W.; and Still, J.L.
Unsaturated fatty acids
inducing pigmentation.
Australian J. Sci. 16: 27-28,
1953.
Chem. Abstr. # 12504a (1953).

Meffered, R.B.; and Loefer, J.B.
Environmental control
of pigmentation in Serratia
marcescens. Texas Rep. Biol..
Med. 11(1): 66-67, 1953.

Moycho, Waclaw.

Bacterium prodigiosum.

Conditions of development
and production of prodigiosin. Acta Soc. Bot. Poloniae.
7: 337-355, 1930.

Biol. Abstr. # 16095 (1934).

Novelli, A.

Factors influencing product—
ion of pigment by Bacterium
prodigiosum. Boll. Ist Sier—
oter. Milan. 32(7-8): 323—
326, 1953.

\* Novelli, A.

The influence of ultraviolet light and chlorophyll on the production of pigment by Bacterium prodigiosum (Serratia marcescens).

J. Bact. 65: 479-480, 1953.
Biol. Abstr. 22735 (1953).
Chem. Abstr. # 6497g (1953).

Poe, C.F.; and Hawkins, J.C.

The effect of some compounds on pigment production by Serratia marcescens. Univ. Colorado Stud., Ser. Chem. Pharm. 1: 28-37, 1952.
Biol. Abstr. # 6265 (1954).

\* Poe, C.F.; and Hawkins, J.C.
Pigment production by
Serratia marcescens in
liquid media. J. Cell. Comp.
Physiol. 33: 448-450, 1949.

## VIII. Prodigiosin: Factors Affecting Pigmentation

Pulvirenti, G.B.

Effect of sulfonamides
and phenic acid on pigment
formation in Serratia

marcescens. Riv. biol. 45(2): 191-198, 1953.

Relation between pigments and metabolism; study of Bacillus prodigiosus and prodigiosin.
Sperimentale. Arch. Biol. 93: 482-488, 1939.

Testa, E.
Conservation of red
pigment of B. prodigiosus
in special media. Rinasc.
Med. 6: 508, 1929.

\* Weil, A.J.
Inhibition of pigment
formation of Serratia
marcescens by chloramphenicol,
aureomycin, and terramycin.
Proc. Soc. Exper. Biol. Med.
79: 539-540, 1952.
Chem. Abstr. # 5661d (1952).

Wrede, F.
Physicochemical properties of prodigiosin, red pigment of Bacillus prodigiosus.
Zeit. Hyg. Infektionskr.
111: 531-535, 1930.

Wrede, F.; and Hettche, O. Prodigiosin, the red pigment of Bacillus prodigiosus. Ber. Deut. Chem. Ges. 62: 2678-2685, 1929.

- \* Wrede, F.; and Rothhaas.A.
  Prodigiosin, the red
  pigment of Bacillus prodigiosus. Zeit. Physiol.
  Chem. 215: 67-78, 1933.
  Biol. Abstr. # 18365 (1934).
- \* Wrede, F.; and Rothhaas, A.
  Prodigiosin, red pigment
  of Bacillus prodigiosus.
  Zeit. Physiol. Chem.
  226: 95-107, 1934.
- \* Wrede, F.; and Rothhaas, A.
  Prodigiosin, red pigment in Bacillus prodigiosus. Zeit. Physiol. Chem.
  219: 267-274, 1933.
  Biol. Abstr. # 18365 (1934).
- \* Wrede, F.; and Rothhaas, A.
  Prodigiosin, red pigmunt of Bacillus prodigiosus. Zeit. Physiol. Chem.
  222: 203-206, 1933.
  Biol. Abstr. # 9882 (1935).

## IX. LIPOIDS FROM SERRATIA MARCESCENS

Daddi. G.

Antigenic potency of pigment-bearing lipoids of Bacterium prodigiosum. Atti. Accad. Fisiocrit. in Siena. 1: 291-296, 1933.

Gorbach, C.; and Sablatnog, A.

Formation of liboids by bacteria. I. Total fat formation in B. prodigioses solid culture media.

Arch. Mikrobiol. 5: 311-317, 1934.
Chem. Abstr. # 54907 (1934).

Gorbach, G.; and
Sablatnüg, A.
Formation of lipoids by
bacteria. II. Total fat
formation in B. prodigiosus
liquid culture media.
Arch. Mikrobiol. 5: 318-327,
1934. 8
Chem. Abstr. 5490 (1933).

# almire. G.H.

Vascular reactions of normal and malignant tissue in vivo. V. The role of 1700-tension in action of bacterial polysaccharide on tumors.

J. Nat'l. Cancer Inst. 12: 1279-1295, 1952.
Chem. Abetr. # 1831c (1953).

Algire, Glenn W.

Vascular reaction of normal
and neoblastic tissues to a
bacterial polysaccharide from

Bacillus prodigiosus culture filtrite. Cancer des. 6(9): 491, 1966.

Biol. dstr. 5842, 1947.

Salgire, C.H.; Domillais, F.Y.; and fark, H.G.

Vancular reaction of north and nonlastic discrete of sice in vivo to perturbation objects ride from Servici marcescens culture filtrates. 3. North. Cancer Inst. 1: 5:-12. 1000.

Beck, L.; Perkinsitz, A.: And Seltzer, .

in normal and other mine as all a cy to servatia and concens two necrotizing polysaccharide of chear. And. Acc. 90th: 40-41, 1946.

Biol. Abstr. - 14098, 1947.

Beck, L.V.: willer, I.V.:
Blauch, L.; and Fisher, L.

Reduction in toxicity of
serratia marcescens polysaccharide to tumor bearing sice
produced by Unjohn Co. Beef
adrenal extract. Cancer Res.
(ann arbor). 7(11): 725-726.
1947.

into its antitisher, a stologic autologic autologic on content on radial agents; eller on radial acceptance of the content acceptance of the content of the

leck, ..v.; cerkowitz. ..; and eluzer, b.

Invaiological studies on tumor-inhibiting agents; effect on apparent systolic blood presider in microsfermatia marcescens tumor-necrosizing polysaccharide of thear.

Jancer des. 8: 162-164, 1988.

X. Polysaccharides from Serratia marcescens: Effect: on Tumors.

\* Brues, A.M.; and Shear, M.J.
Chemical treatment of
tumors; reactions of 4
patients with advanced
malignant tumors to
injection of polysaccharide from Serratia
marcescens culture
filtrate. J. Nat'l.
Cancer Inst. 5: 195208, 1944.

Coley, W.B.

Treatment of inoperable malignant tumors with toxins of erysipelas and bacillus prodigiosus.

Tr. Amer. S.A. 12: 183-212, 1894.

Creech, H.J.; Ankwitz,R.F.,Jr.; and Wharton, D.R.A.

Further studies of the immunological properties of polysaccharides from Serratia marcescens. Cancer Res. (Chicago). 9(3): 150-

157, 1949. Biol. Abstr. # 11101 (1951).

Oreech, H.J.; and Ankwitz, R.F.Jn
Further studies of
immunologic properties of
polysaccharides from Serratia
marcescens; passive immunization against lethal activity of
polysaccharides with fractions
of mouse antiserum elicited
by single injection of polysaccharide. Cancer Res. 9:
589-591, 1949.

Creech, H.J.; Hamilton, M.A.; and Diller, I.C.

Comparative studies of the immunological toxic, and tumor-necrotizing properties of polysaccharides from Serratia marcescens. Cancer Res. 8: 318-329, 1948.

Creech, H.J.; Hamilton, M.A.; Diller, I.C.; Nishimura, E.T.; and Shear, M.J.

Comparative studies of immunological toxic, and tumor-necrotizing properties of Serratia marcescens polysaccharides. Cancer Res. 7: 716, 1947.

Creech, H.J.; Hamilton, M.A.; Nishimura, E.T.; and Ankwitz, R.F.

Influence of antibodycontaining fractions on lethal and tumor-necrotizing actions of polysaccharides from Serratia marcescans. Cancer Res. 8: 330-336, 1948.

Creech, H.J.; Wharton, M.W.; Ankwitz, R.F.Jr.; Wharton, D.A.A; and Diller, I.C.

Properties of the hydrolysis of Serratia marcescens polysaccharides. Cancer Res. (Chicago).9/10: 598, 1949.

Diller, I.C.

Degenerative changes induced in tumor cells by Serratia marcescens polysaccharide. Cancer Res. 7: 605-626, 1947.

# X. Polysaccharides from Serratia marcescens: Effect on Tumors.

Diller, I.C.; Blauch, B.; and Beck, L.V.

Histological changes in adrenal glands of tumor-bearing mice injected with Serratia marcescens polysaccharide alone or in combination with adrenal cotial extract. Cancer Res. 8: 591-605, 1948. Chem. Abstr. 5110a (1949).

Diller, I.C.; and Shear, M.J Cytological effects of S. marcescens polysaccharide on tumors. Cancer Res. 6(9): 488-489, 1946. Biol. Abstr. # 5872 (1947).

Dunn, T.B.; and Lehman, S.

Necrosis produced in
transplanted mouse carinomas with S. marcescens polysaccharide. Cancer Res.
6(9): 488, 1946.
Biol. Abstr. # 5874, 1947.

- \* Francke, F.E.
  Action of toxic doses of polysaccharide from Serratia marcescens (Bacillus prodigiosus) on dog and guinea pig. J. Nat'l. Cancer Inst. 5: 185-193, 1944.
- \* Franke, F.E.
  Attempts to produce
  anaphylaxis in guinea pigs
  with polysaccharide from
  Serratia marvescens.
  J. Nat'l. Cancer Inst. 5:
  173-177, 1944.

\* Franke, F.E.; and Rickert, D.

Effects of sublethal
doses of polysaccharide
from Serratia marcescens on
electrocardiogram, blood
ascorbic acid, and nonprotein nitrogen of dog.
J. Nat'l. Cancer Inst. 5:
179-183, 1944.

Freeman, Gustave.
The anticoagulant effect of bacterial polysaccharodes in normal and thrombocytopenic plasma of leukemia.
Blood. 7: 235-242, 1952.
Chem. Abstr. # 4103f (1952).

Gosselin, W.
Effects des polysaccharides sur le sarcome de la
souris. Rev. Brasil Cancer
3(5): 27-30, 1950,

\* Hartwell, J.L.; Shear, M.J.; and Adams, J.R. Chemical treatment of tumors. III. Nature of hemorrhage-producing fraction from Serratia marcescens culture filtrate. J. Nat'l. Cancer Inst. 4: 107-122, 1943.

Hayashi, Kotaku.

Bacterial polysaccharides.
Igaku to Seibutsugaku (Med. and Biol.) 25: 83-86, 1952.
Chem. Abstr. # 10625h (1953).

\*.Heilbrunn, L.V.; and Wilson, W.L. Effect of bacterial polysaccharide in cell division. Science. 112: 56-57, 1950. Ivins, J.C.; and Dahlin, D.C.
Reticulum-cell sarcoma of
hone. J. Bone Surg. (Amer.
Vol.) 35-A: 4: 835-842, 1953.

\* Kahler, H.; Shear, M.J.; and Hartwell, J.L.

Chemical treatment of tumors; ultracentrifugal and electrophoretic analysis of hemorrhage-producing fraction from culture filtrate of Serratia marcescens. J. Nat'l. Cancer Inst. 4: 123-129, 1943.

Lasfarques, E.Y.L.;
Wharton, D.R.A.; and
Di Eine, J.C.
The effects of
polysaccharide preparations
from Serratia marcescens
and Aerobater aerogenes on
cells in tissue culture.
Cancer Res. 11(6): 425-

427, 1951.

McConnell, J.R.; Hallett, S.F.; and Shear, M.J.

Effect on sarcoma 37 in tissue culture of two tumor-necrotizing agents. Cancer Res. 7: 716, 1947.

\* Malmgren, H.

Physicochemical characteristics of the tumornecrotizing agent from
Serratia marcescens(Shear's
polysaccharide). J. Nat'l.
Cancer Inst. 14: 11191122, 1954.

\* Most, Sylvia
Effect of Shear's polysaccharide on plasma
clotting. Nature 168: 342343, 1951.
Chem. Abstr. # 2688g(1952).

\* Payne, W.J.; Gagan, S.J.; Pollard, A.L.
Comparative methods for the study of bacterial polysaccharides. J. Bact. (Balto). 65(4): 446-448, 1953.

Perrault, A.; and Shear, M.J.
Chemotherapy Sect. National Cancer Institute
(Bethesda). The bacterial
cell of S. marcescens as a
source of tumor-necretizing polysaccharide.
Cancer Res. (Chicago).
9(10): 626-627, 1949.

Perrault, A.; and Shear, M.J.

Large-scale preparation
of tumor-necrotizing polysaccharide from Serratia
marcescens. (Nat'l. Cancer
Inst., Bethesda, Md., 1947).
Cancer Res. 7: 714-715,
1947.

\* Poel, W.E.; Belkin, M.; and Chagnon, C.
Variations in eosinophil morphology and leucocyte counts in the rat following injection of a tumor-necrotizing bacterial polysaccharide.
Amer. J. Physiol. 169: 453-459, 1952.
Chem. Abstr. # 9220a(1952).

\* Rathgeb, P.; and Sylven, B.
Chemical studies on the
tumor-necrotizing agent
from Serratia marcescens (Shear's
polysaccharide. J. Nat'l.
Cancer Inst. 14: 1109-1118,
1954.

ana A in

\* Rathgeb, P.; and Sylven, B.
Fractionation studies
on the tumor-necrotizing
agent from Serratia marcescens (Shear's polysaccharide).
J. Nat'l. Cancer Inst. 14(5):
1099-1108, 1954.

Reinmann, S.P.; Holloman, A.L. Oakey, R.; McConnell, J.R.; and Shear, M.J.

Gross and microscopic pathology of human tumors following administration of S. marcescens polysaccharide. Cancer Res. 6(9): 489, 1946. Biol. Abstr. # 5952 (1947).

- \* Sack, T.; and Seligman, A.M.
  Chemical alteration of
  polysaccharide from
  Serratia marcescens; effects
  of oidopolysaccharide in
  patients with malignant
  tumors. J. Nat'l. Cancer
  Inst. 9: 19-34, 1948.
- \* Seligman, A.M.; and Sack, T.

Chemical alteration of polysaccharide from S. marcescens; reaction of polysaccharide with radio-active p-iodobenzene dia-zonium chloride and use of produce in experimental and clinical study. J. Nat'l. Cancer Inst. 10: 105-118, 1949.

\* Seligman, A.M.; Shear, M.J.; Leiter, J.; and Sweet, B. Chemical alteration of polysaccharide from Serratia marcescens; tumornecrotizing polysaccharide tagged with radioactive iodine. J. Nat'l. Cancer Inst. 9: 13-18, 1948. .

- Seligman, A.M.; Leiter, J.; Sweet, B.; and Shear, M.J. Tumor necrotizing bacterial polysaccharide tagged with radioactive iodine. Cancer Res. 7: 715, 1947.
- \* Shear, M.J.

  Chemical treatment of tumors; reactions of mice with primary subcutaneous tumors to injection of hemorrhage-producing bacterial polysaccharide. J. Nat'l. Cancer Inst. 4: 461-476, 1944.
- \* Shear, M.J.; and Adams, J.R.Jr.
  Chemical treatment of tumors
  Nature of hemorrhage-producing fraction from Serratia
  marcescens culture filtrate.
  J. Nat'l. Cancer Inst. 4:
  107-122, 1943.
- \* Shear, M.J.; and Perrault, A.
  Chemical treatment of
  tumors. Reaction of mice
  with primary subcutaneous
  tumors to injection of a
  hemorrhage producing bacterial
  polysaccharide. J. Nat'l.
  Cancer Inst. 4:461-476, 1944.

- X. Polysaccharides from Serratia marcescens: Effect on Tumors.
- \* Shear, M.J.; Perrault, A.; and Adams, J.R.

Chemical treatment of tumors; method employed in determining potency of hemorrhage-producing bacterial preparations. J. Nat'l. Cancer Inst. 4: 99-105, 1943.

- \* Shear, M.J.; and Turner, F.C.
  Chemical treatment of
  tumors; isolation of hemorrhage-producing fraction
  from culture filtrate.
  J. Nat'l. Cancer Inst. 4:
  81-97, 1943.
- \* Shimkin, M.B.; and Zon, L.
  Role of thromboctopenia
  in hemorrhage producted in
  sarcoma.(37). J. Nat'l.
  Cancer Inst. 3(4): 379382, 1943.
  Biol. Abstr. # 18489, 1943.
- \* Wharton, D.R.A.; and Creech, H.J.

Further studies of immunologic properties of polysaccharides from Serratia marcescens (Bacillus prodigiosus): nature of antigenic action and antibody response in mice. J. Immunol. 62: 135-153, 1949. Biol. Abstr. # 4397 (1950). \* Westfall, B.B.; and Dunn, T.B.

Blood uric acid and
proteese, body temperature
and glomerular clearance of
rabbits implanted with
Trown-Pearce carcinbma and
treated with polysaccharide
from Serratia marcescens.
J. Nat'l. Cancer Inst. 7:
115-121, 1946.

Akiba, T.; and Iwata, K.

A phenomenon of invasion and destruction of a
certain bacterium against
Candida cells. Japan. J.
Bact. 8(9): 951-960, 1953.

\* Balamuth, W.; and Brent, M.M.

Biologic studies on

Endamosba histolytica;
direct action of antibiotic,
prodiciosin. Proc. Soc. Exper.

Biol. Med. 75: 374-378, 1950.

Bitter, C.R.

Bacterial antibiosis.

J. Colorado-Wyoming Acad. Sci.
3(1): 16-17, 1941.

Biol. Abstr. # 18967, 1947.

Chatton, E.; and Chatton, M.
On the immediate cytolytic power of cultures of some
chromogenic bacteria.
Compt. rend. Soc. Biol. 97:
289-292, 1927.
Biol. Abstr. # 17985(1928).

Derkach, V.S.; Povelitsa, F.D.; and Boldyreva, L.V. Antibiotic properties of bacterial pigments.(prodigiosin and pyocyanine). Vrach. Delo. 25: 289-298, 1945.

\* Fuller, A.T.; and Horton, J.M.
Marcescens, an antibiotic
substance from Serratia
marcescens. J. Gen. Microbiol.
4(3): 417-433, 1950.

Hettche, H.O.

Bactericidal and anthracoccidal components of
Bacillus pyocyaneus and
Bacillus prodigiosus.
Arch. Hyg. 107: 337-353, 1952.

Kidder, G.W.; and Stuart, C.A.
Growth studies on
ciliates. I. Therole of
bacteria in the growth and
reproduction of Colpoda.
Physiol. Zool. 12: 329340, 1939.
Biol. Abstr. # 5800 (1940).

\* Lack, A.
Antibiotic action on
Coccidioides immitis in
vitro. Proc. Soc. Exper.
Biol. Med. 72(3): 656658, 1949.
Biol. Abstr. # 12889(1950).

\* Lack, A.

Prodigiosin; antibiotic action on Coccidioides immitis in vitro. Proc. Soc. Exper. Biol. Med. 72: 656-6 658, 1949.

\* Lichstein, H.C.; and Van de Sand, V.F. Antibiotic activity of prodigiosin. J. Bact. 52: 145-146, 1946.

#### XI. Anti-biotics and Antibacterial Effects of Serratia marcescens

Masera, Enrico.

Phenomena of antagonism and antibiosis between Bacillus prodigiosus and Beaveria bassiana. Ann. Sperimentaz. Agrar. 15: 117-150, 1934. Biol. Abstr. # 14139 (1935).

\* Martin, S.P.; and
Chaudhuri, S.N.

Effect of bacteria
and their products on
migration of leucocytes.
Proc. Soc. Exper. Biol.
Med. 81: 286-288, 1952.
Chem. Abstr. # 2256f(1953).

Ochler, R.
Growing of ciliates
with pure cultures of
bacteria. Arch. Protistenk. 41: 34-49, 1920.
Abstr. Bact. # 183 (1921).

- \* Rao, V.G.

  Sterilization of cysts of entamoeba histolytica by chemical disinfectants, and initiation and maintenance of pure cultures in association with single species of bacteria. Trans. Roy. Soc. Trop. Med. Hyg. 44(5): 593-604, 1951.
  Biol. Abstr. # 35165(1951).
- \* Singh, B.N.

  Toxic effects of certain bacterial metabolic products on a soil protozoa.

  Nature. 149: 168, 1942.

\* Beeson, P.B.
Tolerance to bacterial
nyrogens, T. Factors
influencing its development.
J. Exper. Med. 86(1): 2938, 1947.
Biol. Abstr. # 22641 (1947).

\* Bennett, I.L. fr.; and Beeson, P.B.

The effect of cortisonne apon reactions of rabbits to bacterial endotoxins with particular reference to acquired resistance. Bull. Johns Hopkins Hosp. 93(5): 290-308, 1953.

Bose, B.C.; and Ahuja, M.L.
Detection of pyrogens
in fluids by biological
methods. Indian J. Med. Res.
32(1):9-14, 1944.
Biol. Abstr. # 3100 (1945).

Friedberger, E.; and Joachi-moglu, G.

Further study of the effect of anaphylatoxin on the isolated intestine, with comparative investigation of the injurious effect of heated homologous serum on the movement of the isolated intestine. Zeit. Immunitätsforsch. 28: 198-216, 1919. Abstr. Bact. # 433 (1920).

Hutchinson, G.B.; and
Thaysen, A.C.
The non-persistence of
Bacterio-toxins in the soi

Bacterio-toxins in the soil. J. Agric. Sci. 9: 43-62, 1918. Abstr. Bact. # 98 (1919).

Neuweiler, W.

On the toxin-forming and detoxicating serum of certain absorbents upon the fresh normal serum of various animals.

Zeit. Immunitätsforsch.

38: 369-402, 1923.

Abstr. Bact. # 626( 1925)

\* Parker, J.T.

A specific poison in the liver extracts of rabbits inoculated with typhoid and prodigiosus bacilli intravenously. J. Exper. Med. 28: 571-583, 1918. Bruynoghe, G.

The agglutination of Bacillus prodigiosus. Compt. rend. soc. biol. 121: 175-176, 1936.

Képinov, Léon.

Study of non-specific immunity. Immunizationing action of non-specific bacterial filtrates on choleraic infection. Compt. rend. soc. biol. 91: 244-246, 1924. Abstr. Bact. # 419 (1925).

Kondo, S.

On the mechanism of the hemolytic effect of serum and inactivation of complement. Investigations with inulin and B. prodigiosus. Zeit. Immunitätsforsch. 36: 76-96, 1923. Abstr. Bact. #961(1925).

Lasseur, Ph.; et Dupaix-Lasseur, A.

Etude sérologique de quelques types de Serratia. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 12: 24-41, 1939-1941. Biol. Abstr. # 22041 (1945).

Lasseur, Ph.; Dupaix-Lasseur, A. and Georges, H.

Action of a serum prepared with a dissociated type Rb, S or Ra on the dissociated forms Rb, S or Ra of a different bacterial species. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 11: 45-47, 1938. Launoy, L.
Antiprotease sera. Their specificity. The antiprotease reaction. Ann. Inst. Pasteru. 34: 249-270, 1920. Abstr. Bact. # 1495, 1920.

\* Marchal, J.G.
Natural appluti

Natural agglutinins in plants. Compt. rend. soc. biol. 136: 760, 1942.

Marchal, J.G.; Massignon, C.; and Thomas, P.

Contribution à l'étude des réactions immunitaires chez les végétaux. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 16: 146-170, 1948-1949. Biol. Abstr. # 21657 (1951).

Marchal, J.G.; Thomas, P.; and Massignon, C.

Contribution á l'étude de l'immunité naturelle chez les végétaux. Trav. Lab. Microbiol. Fac. Pharm. Nancy. 16: 128-145, 1948-1949. Biol. Abstr. # 21656 (1951).

Paraschivesco, Z.
Complete somatic
antigen of Micrococcus
prodigiosus. Compt.
rend. soc. biol. 121:
175-176, 1936.

## Schlang, H.A.

Provocation of the Schwartzman phenomenon by local injection of bacterial filtrate.
N. Med. Res. Inst.
(Bethesda). 11: 1185-1190, 25 Nov. 1953.
Res. Rept. Proj. MM
000 018. -05.04.

Schwartzman, G.
Phenomenon of local
skin reactivity to
Serratia marcescens;
immunologic relationships
between Serratia marcescens
culture filtrates and
Shear polysaccharide.
Cancer Res. 4: 191-196,
1944.
Biol. Abstr. # 10647 (1944).

Thomas, Lewis; Good, R.A.; and Little, J.N.

Effect of cortisone on the Schwartzman reaction. Production of leisons resembling dermal and generalized Schwartzman reactions by single injection of bacterial toxin in cortisone-rabbits.

J. Exper. Med. 95: 409-427, 1952.
Chem. Abstr. # 9703f(1952).

\*Weil, A.J.

Agglutination by antihog cholera hyper-immune
sera of antigen obtained
from spinal fluid of pigs
infected with hog cholera
and adsorbed on Bacillus
prodigiosus.

I. Immunol. 45: 187-191,

-39-

1942.

Aitoff, M,; Dion, M.; and Dobkevitch, II.

Isolation from man of Bacillus prodigiosus pathogenic for animals; endotoxin and production of Schwartzman reaction. Compt. rend. soc. biol. 123: 375-376, 1936.

- \* Aronson, J.D.; and
  Alderman, I.

  The occurrence and
  bacteriological character—
  istics of Serratia marces—
  cens from a case of
  mengitis. J. Bact. 46(2):
  218, 1943.
  Biol. Abstr. # 24307, 1943.
- \* Aronson, J.D.; and Alderman, I.

  Occurrence and bacteriologic characteristics of
  Serratia marcescens from a
  case of meningitis.
  J. Bact. 46: 261-267, 1943.

Bonino, M.
Immunitary defences in experimental infections in guinea pigs with Bacterium prodigiosum.
Gior. Batteriol. Immunol.

11: 625-661, 1933.

Bortolotti, R.
Equilibrum of immunity
in experimental B. prodigiosus infection in rabbit.
Gior. Batteriol. Immunol.
10: 592-599, 1933.

Bruzzone, L.

Quantitive distribution
of organisms (B. prodigiosum introduced by arterial

sum introduced by arterial and venous routes respectively. Gior. Batteriol.
Immunol. 13: 540-546, 1934.

Caporale, L.

Equilibrium of defensive reactions in experimental reinfection with Bacillus prodigiosus. Soc. Internaz. Microbiol., Boll. Sez. Ital. 3: 663-666, 1931.

\* Cralley, L.J.
Factors affecting
retention and rate of
removal of bacteria from
tracheal tree and lungs.
Amer. J. Hyg. 36(3):
303-310, 1942.
Biol. Abstr. # 5665, 1943.

Curtin, M.
Otorrhee chronique due au Bacillus prodigiosus. Ann. Otolar., Par. 68(8-9): 738-739, 1951.

Cutin, M.; and Sapuppo, R.
Chronic suppurative
otitis media due to
Bacillus prodigoisus.
Rev. Paulista Med. 39:
358-359, 1951.

\* Gurevitch, J.; and Weber, D.
A strain of Serratia
isolated from urine.
Amer. J. Clin. Path. 20(1):
48-49, 1950.

\* Hawe, A.J.; and Hughes, M.H.

Bacterial endocarditis
due to Chromobacterium
prodigiosum; report of a
case. Brit. Med. J.

# 4868: 968-970, 1954.

Khintchuk, A.G.
Bacillus prodigiosus
in pyelitis. Vestnik.
Mikrb. Epidemiol. 9:
112-113, 1930.
Biol. Abstr. # 10689,1932.

Levy, J.

Meningitis due to
Serratia marcescens.
(English Abstr.)
Harefual, Tel-Aviv.
42(7); 87-88, 1952.

\* McEntegart, M.G.; and Porterfield, J.S. Bacteråemia following dental extractions. Lancet 257(6579): 596-598, 1949. Biol. Abstr. # 19841(1950).

Mazzei, A.
Behavior of Bacillus
prodigiosus in conjectival
sac. Riforma Med. 37:
102, 1921.

Murri, A.
Equilibrium in
immunity; research on
Bacillus prodigiosus.
Gior. Batteriol. Immunol.
6: 719-738, 1931.

Murri, A.

Mixed infections and immunitary equilibrium; researches with Streptococci and Bacillus prodigiosus. Gior.
Batteriol. Immunol. 14: 1172-1210, 1935.

Mussa, B.; and Virando, A. Immunitary defense against infections in relation to age; experimental research. Gior. batteriol. Immunol. 10: 1057-1150, 1933.

\* Paine, T.F.

Illness in man following inhalation of Serratia marcescens. J. Infect.
Dis. 79(3): 226-232, 1946.
Biol. Abstr. # 12066, 1947.

Pugnani, E.
Equilibrium in immunity;
research on Bacillus prodigiosus. Gior. Batteriol.
Immunol. 6: 774-796, 1931.

Pugnani, E.
Equilibrium of immunitary defense and mechanism
of proteinotherapy in
animals infected with Bacterium prodigiosum and subjected to specific and
aspecific stimuli. Gior.
Batteriol. Immunol. 14:
765-940, 1935.

#### XIV. Pathogenicity

Rabinowitz, K.; and Schriffin, R.
A strain of Serratia
marcescens isolated from a
case of mengingitis in a
child. (English Abstract).
Harefual, Tel-Aviv 42(7):
88-90, 1952.

Rabinowitz, K.; and Schiffrin, R.

A ward-contamination by
Serratia marcescens. Acta Med.
Orientalia. 11: 181-184,
1952.
Bull. Hyg. 28: 473, 1953.

\* Rheingold, J.C.

Effect of feeding on rate of removal of prodigiosus bacilli from blood of dogs. J. Infec. Dis. 47: 130-137, 1930.

Risko, T.; Nikodemusz, I.; Tomka, I. B. prodigiosus pathogen hatasa. Orv. Hetil. 93(23): 673-674, 1952.

- \* Rosahn, P.D.; and Ju, C.K.
  Pathogenicity of serratia
  marcescens. Proc. Soc.
  Exper. Biol. Med. 30:
  1326-1327, 1933.
- \* Thomas, L.; and Good, R.A.

  Bilateral cortical
  necrosis of the kidneys
  in cortisone-treated rabbits
  following injection of
  bacterial toxins. Proc.
  Soc. Exp. Biol. Med. 76(3):
  604-608,1951.
  Biol. Abstr. # 27216(1951).

Thomspson, J.L.

Meningitis caused by
Bacillus prodigiosus;
report of a case. Med.
Ann. Dist. Columbia 12:
145-146, 1943.

\* Tuttle, W.M.; and Cannon, P.R. The passage of bacteria from the lungs into the blood stream. J. Infec. Dis. 56: 31-37, 1935.

Virando, A.

Experimental study of elective localization of bacteria. Gior. Batteriol. Immunol. 12: 1-38, 1934.

Virando, A.

Equilibrum of immune reacts ions to infection with B. prodigiosus in rabbits subjected to inanition and avitaminosis. Gior. Batteriol. Immunol. 8: 596-614, 1932.

# XV. BACTERIOPHAGE

Boulgakow, N.
On races of bacteriophage virulent for Bacillus prodigiosus.
Compt. rend. soc. biol.
102: 981-982, 1930.

\* Wassermann, M.M.; and Seligmann, E. Serratia marcescens bacteriophages.
J. Bacteriology 66: 119, 1953.

# EVI. NUTRIENT EFFECTS OF SERRATIA MARCESCENS

\* Chinn, B.D.; Jacobs, L.;
Reardon, L.V.; and
Rees, C.W.

The influence of bacterial flora on cultivation of
Endamoeba histolytica.

Amer. J. Trop. Med. 22(2):
137-146, 1942.
Biol. Abstr. # 19169, 1942.

\* Hill, D.C.; and Branion, H.D. Chick-growth studies with dried cells of a strain of Serratia marcescens. Poultry Sci. (Mesearch Notes) 32: 367-368, 1953. Chem. Abstr. # 11372a (1953). Kastal'skaia-Karzinkina, M.A.

Materialy po pitanium
dafnii. (Data on the
nutrition of Daphnia.)
Zoologicheskii Zhurnal
U.S.S.R. 21(4): 153-164,
1942.
Biol. Abstr. # 9674 (1946).

#### XVII. VITAL STAINING OF INFUSORIA BY SERRATIA MARCESCENS

Semenov, V.E.; and Maslova, A.S.
Vital staining of
infusoria by means of
phagocytosis of B. prodigiosus. Arkhiv. Anatomi,
Gishologii Emriologii.
13: 351-358, 1934. In
German, p. 435-441.
Biol. Abstr. # 7040 (1936).

Semenov, V.E.; and Maslova, A.S.
Vital staining of
infusoria by phagocytosis
of Bacillus prodigiosus.
Arch. Protistenk. 85: 224233, 1935.
Biol. Abstr. # 17125 (1936).

\* Breed, R.S.; and Breed, M.E.

Economic importance of Serratia marcescens and closely related organisms. Abstr. Bact. 9: # 1767 (1925). (Author's abstr.)

Christensen, L.J.;
Decker, C.W.; and
Ashworth, U.S.
Keeping quality of
whole milk powder. I-II.
J. Dairy Sci. 34: 404418, May 1951.

Funk, E.M.
Pasteurization of
shell eggs. Res. Bull.
Missouri Agri. Expt.
Sta. 364, 1-28, 1943.
Biol. Abstr. # 15891(1946).

Goeters, W.

"Bber das Bakterienwachstum in roher und
gekochter Frauenmilch.
Zeit. Kinderheilk. 61(2):
184-197, 1941.
Biol. Abstr. # 22198(1943).

\* Holtman, D.F.

Serratia marcescens as
a cause of pink sauerkraut;
Abstr. J. Bact. 43(1):
40, 1942.
Biol. Abstr. # 2164 (1943).

#### Lindet.

Investigations into the changes undergone by eggs. Compt. rend. Seances 1'Acad. d'Agric. de France. 3: 320-329, 1917. Oliveira, J.J.A.De.
An examination of lactobacillus in ordinary milks.
(In Portuguese). Portugal
Div. Geral dos Serv. Pecuarios. B. Pecuario. 16:
131-133, 1948.

\* Schioppa, L.
Spontaneous appearance
of red color in soup pastes
due to presence of Bacillus
prodigiosus. Ann. Ig. 46:
260-262, 1936.

Seedon, H.R.
Sheep blowfly problem.

III. Bacterial coloration of wool. Dept. Agr.,

N.S.Wales, Sci. Bull.

54: 61-65, 1937.

Skerman, P.J.
Intermittent propagation of cheese starter cultures. J. Australian Inst. Agric. Sci. 11(2): 92, 1945.
Biol. Abstr. # 3960 (1947).

Steinhaus, E.A.

Bacterial infections of potato tuber moth larvae in an insectary. J. Econ. Ent. 38(6): 718-719, 1945.
Biol. Abstr. # 16364(1946).

Supplee, G.C.

Preliminary note on
certain changes in some of
the nitrogenous constituents
of milk caused by bacteria.
J. Dairy Sci. 1:313-319,1917.
Abstr. Bact. # 1526(1918).

#### XIX. AEROSOLS AND MISCELLANEOUS USES FOR SERRATIA MARCESCENS

\* Appleton, J.L.T.; Klein,H.; and Palmer, C. A method for measur-

- #

A method for measuring the rate of elimination of bacteria from the human mouth. Amer. J. Hyg. 28: 213-231, 1938.

\* Jennings, F.L.
The permeability of paper sputum napkins.
Amer. Rev. Tuberc. 32: 304-311, 1935.

Johansson, K.R.; and Ferris, D.H. Airborne particles during bacteriological plating operations. Lantern slides or prints from high speed photographs. Biol. Abstr. # 9262 (1948)

- \* Johansson, K.R.; and
  Ferris, D.H.
  Photography of airborne
  particles during bacteriological plating operations. J. Infect. Dis.
  .78(3): 238-252, 1946.
  Biol. Abstr. # 1404 (1947).
- \* Peppler, H.J.
  Usefulness of microorganisms in studying
  dispersion of flies. Bull.
  U.S.Army Med.Dept. 75: 121,
  1944.
  Biol. Abstr. # 14974 (1944).

Skrynska, Jadwiga.

The microbiological
examination of the troposphere: Meterological
influence. Med. Doswiadczalna Microbiol.
1: 294-343, 1949.
(Artificial spredding of
Bacterium prodigiosum
at heights of 300-2000m.)
Biol. Abstr. # 24215 (1949).

\* Tolman, R.C.; Guernsey, E.W.; Charleston, V.D.; and Dougherty, R.H.

The protection afforded by various filters against bacterial suspensions in air. J. Infect. Dis. 24: 637-647, 1919.

Abstr. Bact. # 922 (1919).

## XX. INFLUENCE OF SERRATIA MARCESCENS IN THE NITROGEN STATUS OF SOIL

Bhat, J.V.; and
Palacios, G.
Studies on influence
of some bacterial cultures
in the nitrogen status of
soil. Influence of
Serratia marcescens in the
nitrogen status of soil.
J. Univ. Bombay. 16B:
15-22, 1948.

- \* Bergeim, O.; Hanszen, A.H.; Pincussen, L.; and Weiss, E. Relation of volatile fatty acids and hydrogen sulphide to the intestinal flora. J. Infect. Dis. 69(2): 155-166, 1941. Biol. Abstr. # 23934 (1941).
- \* Boone, T.H.; Chase, E.M.; and Brink, H.E. Intestinal absorption of Bacillus prodigiosus. Proc. Soc. Exper. Biol. Med. 29: 113-116, 1931.

Dack, G.M.; and Woolpert, O.
Bacteriology of various
levels of intestine of
Macacus rhesus monkeys with
special reference to technic
and to fate of Bacillus
prodigiosus.
J. Prev. Med. 6: 129-139, 1932.

- Grünewald, W.

  "ber die Bedingungen der Ansiedlung körperfremder
  Bakterien im Verdauungstraktus. Arch. Hyg. Bakt.
  102: 324-332, 1929.
  Biol. Abstr. # 20693 (1931).
- \* Wedberg, S.E.; Brandt, C.D.; and Helmboldt, C.F. Passage of microorganisms through digestive tract of blaberus cranifer mounted under controlled conditions. J. Bact. 58(5): 573-578, 1949. Biol. Abstr. # 25512(1950).

#### AUTHOR INDEX

Adams, J.R., see: Hartwell, J.L. 31. Shear, M.J. 33, 34. Ahuja, M.L., see Bose, B.C. 37. Aitoff, M.; Dion, M.; and Dobkevitch, H. 40. Akiba, T.; and Iwata, K. 35. Alderman, I., see Aronson, J.D. 40. Algire, G.H. 29. \_; Legallais, F.Y.; and Park, H.D. 29. Alha, A.R. 15. Alm, F., see Nillson, R. 12. Amako, T.H. 15, 24. Amster, S.; and Meyer, P.S. 15. Andreson, P.H. 8. Ankwitz, R.F.; see Creech, H.J.30. Ankwitz, R.F., Jr., see Creech, H.J. 30. Appleton, J.L.T.; Klein, H.; and Palmer, C. 47. Arloing, F.; and Thevenot, L. Aronson, J.D.; and Alderman, I. 40. Ashworth, U.S., see Christensen, L.J. 46. Aubert, J., see Lasseur, Ph. 18. Bach, D.; and Lambert, J. 8. Baird, G.R., see Koser, S.A. 10. Bal, D.V. 8. Balamuth, W., and

Bach, D.; and Lambert, J. 8.
Baird, G.R., see
 Koser, S.A. 10.
Bal, D.V. 8.
Balamuth, W., and
 Brent, M.M. 35.
Balozeth L., see
 Velu, H. 7.
Beck, L.V.; and
 Fisher, Mary. 29.
 ; Diller, I.C.; Blauch, B.;
 and Fisher, M. 29.
Beeson, P.B. 37.
 \_\_\_\_, see
 Bennett, I.L., Jr. 37.

Bèguet, M. 3, 5, 15, 24. Belkin, M., see Poel, W.E. Bell, A.E., see Lutsky, I.L. 18. Benetti, R., see Politi, I. 18. Bennett, I.L.Jr.; and Beeson, P.B. Berencsi, G. 8. \_, see Illenyi, A. 10. \_; and Illenyi, A. 8. Bergamini, L. 8. Bergeim, O.; Hanszen, A.H.; Pincussen, L.; and Weiss, E. 49. Berkowitz, D., see Beck. L. 29. Berman, N.; and Rettger, L.F. Binstock, Harold. 15. Birkeland, J.M., see Steinhaus, E.A. 4 Bitter, C.R. 35. Beck, L.; Berkowitz, D.; and Seltzer, B. 29. Beck, L.V., see Diller, I. C. 31. Bhat, J.V.; and Palacios, G. 48. Blackwood, A.C., see Neish, A.C. Blauch, B., see Beck, L.V. 29. Diller, I.C. 31. Blawat, F. 3. Bloom, W., see Kharasch 25. Boldyreva, L.V., see Derkach, V.S. Bonetti, E.; and Illenyi, A. 16. Bonino, M. 40.

Boone, T.H.; Chase, E.M.;
and Brink, H.E. 49.
Bortels, H. 20. Bortelli, R. 40.
Bortolli, R. 40.
Bose, B.C.; and
Ahuja, M.L. 37. Boulgakow, N. 43.
Bozenko, V.P. 23.
Brandt, C.D., see
Wedberg, S.E. 49.
Branion, H.D., see
Branion, H.D., see Hill, D.C. 44.
Brawerman, G., see
Zamennoi, 5. 14.
Breed, M.E., see
Breed, R.S. 46.
Breed, R.S., see
Pedersen, C.S. 13.
Brent, M.M., see
Balamuth, W. 35.
Brink, H.E., see
Boone, T.H. 49.
Brues, A.M.; and Kjaer, A. 15. Brues, A.M.; and Shear, M.J. 30
Brues, A.M.; and Shear, M.J. 30
bruynogne. G. 38.
Bruzzone, L. 40. Busing, K.H.; and Peters, F. 8.
Punting H. see
Bunting, H., see Bunting, M.I. 24.
Bunting, M.I. 24. Bunting, M.I. 5.
see
Labrum, E.L. 7.
: and Ingraham (). 5.
; Labrum, E.L.;
and Hemmerly, J. 6.
Bushing U O
Buonomini G. 6.
Bunting, H. 24. Buonomini, G. 6. Burge, W.E. 20.
Burkholder, P.R.; McVeigh, I.;
Burkholder, P.R.; McVeigh, I.; and Wilson, K. 8.
Burge, W.E. 20. Burkholder, P.R.; McVeigh, I.; and Wilson, K. 8. Burnett, J.M., see
Burkholder, P.R.; McVeigh, I.; and Wilson, K. 8.

Cannon, P.R., see Tuttle, W.M. 42.
Caporale, L. $h0$ .
Caporale, L. 40. Chargaff, E. 8.
Chargaff, E.B., see
Zamenhof, S. 14.
Chagnon, C., see
Chagnon, C., see Poel, W.E. 32.
Chase, E.M., see Boone, T.H. 49.
Boone, T.H. 49.
unatton, E.; and
Chatton, M. 35.
Chatton, M., see Chatton, E. 35.
Chatton, E. 35.
ouguduuri, D.M., 566
Martin, S.P. 36.
Chinn, B.D.; Jacobs, L.; Reardon, L.V.; and
Reardon, L.V.; and
Rees, C.W. 44. Christensen, L.J.;
Unristensen, L.J.;
Ashmath H.C. 14
Decker, C.W.; and Ashworth, U.S. 46. Churchman, J.W. 3, 15, 16. Cicconi, M. 20, 23.
Cincomian, 0.W. 3, 13, 10,
Cola, C., see
Politi, I. 18.
Coley, W.B. 30.
Combe, E., see
Lasseur, Ph. 7, 25, 26.
Conway, E.A., see
Kharasch, M.S. 25.
Challer I.J. LA
Creech, H.J.; and Ankwitz, R.F.Jr. 30.
Ankwitz, R.F.Jr. 30.
; AHKWLUZ, R.F.JF.;
and Wharton, D.R.A. 30; Hamilton, M.A.;
; Hamilton, M.A.;
and Diller, I.C. 30; Hamilton, M.A.;
Diller, I.C.;
Mighinum E. H.
Nishimura, E.T.; and Shear, M.J. 30.
· Wharton M W
; Wharton, M.W.; Ankwitz, R.F.Jr.;
Wharton, D.R.A.;
and Diller, I.C. 30.
, , , , , , , , , , , , , ,

Creech, H.J.(cont'd)

; Hamilton, M.A.;
Nishimura, E.T.; and
Ankwitz, R.F. 30.
Crichton, P.C.; and
Lazerus, A.S. 8.
Curtin, M. 40.
Cutin, M.; and
Sapuppo, R. 40.
Cyllenberg, H., see
Hietaranta, M. 10.

Dack, G.M.; and Woolpert, 0. 49. Daddi, G. 6, 28. Dahlin, D.C., see Ivins, J.C. 32. Davis, D.J. 9. Davis, J.G., see Jones, V.E. 3. Day, G.M. 16. De Graaff, W.C. 16. Deacon, W.E. 23. Decker, C.W., see Christensen, L.J. 46. Decker, R., see Lasseur, Ph. Derkach, V.S.; Povelitsa, F.D.; and Boldyreva, L.V. 35. Dernby, K.G. 9. Di Eine, J.C., see Lasfargues, E.Y.L. 32. Diehl, H.S. 9. Diller, I.C. 30. , see Beck, L.V. 29. Greech, H.J. 30. \_; Blauch, B.; and Beck, L.V. 31. \_; Shear, M.J. 31. Dion, M., see Aitoff, M. 40. Dobkevitch, H., see

Aitoff, M. 40.

Eisler, M.; and
Jacobsohn, I. 16.
Ellinger, P.H.; and
Gruhn, E. 16.
Escal, F., see
Lasseur, Ph. 21.
Euler, H.V. 9.

Ferris, D.H., see Johansson, K.R. 47. Fischer, H.; und Gangl, N. 24. Fischer, R. 16. \_; and Larose, P. 16. Fischer, K.C., see Fowle, A.C. 20. McLean, D.J. 11. Fisher, M., see Beck, L.V. 29. Florentin, P., see Lasseur, Ph. Follis, R.H.; and Burnett, J.M. 9, .17. Follis, R.H., Jr., see Rollis, R.H. 17. ; Burnet, J.M.; and Laschever, Z.E. 17. Fortner, J. 3.

Fortner, J. 3. Fowle, A.C.; and Fisher, K.C. 20, 23. Fram, H.; Proctor, B.E.; and Dunn, C. 20, 23. Francke, F.E. 31 Frank, 1. Franke, F.E.; and Rickert, D. 31. Fredericq, P. 9. Freeman, Gustave. 31. Friedberger, E. 17. \_; and Joachimoglu, G. 37. Füchtbauer, H.; and Theisman, H. 20. Fukumoto, K. 24. Fuller, A.T.; and Horton, J.M. Funk, E.M. 46. Gagan, S.J., see Payne, W.J. 32. Gangl, K., see Fischer, H. 24. Gavoille, M. Th., see Lasseur, Ph. 11. Gavoille, Th., see Lasseur, Ph. 21. Georges, H., see Lasseur, Ph. 1, 26, 38. Gersheinfeld, L.; and Witlin, B. 17. Giabicani, R., see Lasseur, Ph. 21. Giolitti, G. 9, Girard, Th.; see

Lasseur, Ph.

Marchal, J.G. 18, Goeters, W. 46.

Goldsworthy, N.E.; and Still, J.L. 24.

Good, R.A., see Thomas, L. 39, 42.

Goncharov, G.D. 20.

18.

Gorini, C. 9. Gosselin, W. 31. Gray, P.H.H. 3. Grun, L. 17. Grunewald, W. 49. Gruhn, E., see Ellinger, P.H. Guida, V.O., see Rodrigues, C. 18. Gurevitch, J.; and Weber, D. 40. Haberman, Sol. 20. Hallett, S.F., see Mc Connell, J.R. 32. Hamilton, M.A., see Creech, H.J. 30. Hanszen, A.H., see Bergeim, O. 49. Hanszen, Arthur. 17. Hartwell, J.L., see Kahler, H. 32. ; Shear, M.J.; and Adams, J.R. 31. Hawe, A.J.; and Hughes, M.H. 41. Hawkins, J.C., see Poe, C.F. 26. Hayashi, Kotaku. 31. Hayashi, S. 9. Heilbrunn, L.V.; and Wilson, W.L. 31. Heinzel, E. 3. Hellat, A. 17. Helmboldt, C.F., see Wedberg, S.E. 49. Hemmerly, J., see Bunting, M.I. 6. Hes, J.W. 9. Hettche, H.O. 35. Hettche, O., see Wrede, F. 27. Hietaranta, M., and Cyllenberg, H. 10.

Gorbach, G. 24.

Sablatnög, A.

\_: and

æ

" Hill, D.C.; and Branion, H.D. 44. Holloman, A.L., see Reinmann, S.P. Holtman, D.F. 46. Holzer, H., see Janke, A. 10. Holweck, F.; and Lacassagne, A. 20. Horton, J.M., see Fuller, A.T. 35. Hughes, M.H., see Hawe, A.J. 41. Hubbard, R.; and Rimington, C. 24. Hutchinson, G.B.; and Thaysen, A.C. 37.

Jacob, P., see
Lasseur, Ph. 21.
Jacobs, L., see
Chinn, B.D. 44.
Jacobsohn, I., see
Eisler, M.
Jakob, A.; and
Mahl, H. 17.
Janke, A.; and
Holzer, H. 10.
Jennings, F.L. 47.

Jennison, M.W. 3.
Jensen, H.L.; and
Petersen, H. 10.
Joachimoghi, G., see
Friedberger, E. 37.
Johansson, K.R.; and
Ferris, D.H. 47.
Jones, V.E.; and
Davis, J.G. 3.
Ju, C.K., see
Rosahn, P.D. 42.

Kahler, H.; Shear, M.J.; and Hartwell, J.L. 32. Kaplan, R.W. 6. Kastal'skaia-Karzinkina, M.A. 44. Kepinov, Leon. 38. Kharasch, M.S.; Conway, E.A.; and Bloom, W. 25. Kidder, G.W.; and Stuart, C.A. 35. Kimura, H. 10. Kjaer, A., sec Brodersen, R. 15. Klein, H., see Appleton, J.L.T. 47. Klintchuk, A.G. 41. Knapp, A., see Dold, H. 16. Kochi, Mutsuyuki. 17 Kodama, Keishun. 10, 25. Kondo, S. 38. Koser, S.A.; and Baird, G.R. 10. \_; and Kasai, G.J. 9. ; and Rettger, L.F. 11.
Kost, P.F. 25.
Koyama, S. 17.
Kraay, G.M.; and Wolff, L.K. 11. Kreitlow, K.W. 25. Kufferath, H. 4. Kwapinski, J.; and Pietraszkiewiczowa, H. 25.

La Grutta, L. 18.
Lacassagne, A.; see
Holweck, F. 20.
Lack, A. 35.
T.I T.T
Labrum, E.L., see
Bunting, M.I. 6, 7.
Lambert, J., see Bach, D. 8.
Jach, D. S.
Landesman, M. 3.
Laroche, G., see Lasseur, Ph. 18.
Lasseur, Ph. 18.
Larose, P., see Fischer, R. 16. Laschever, Z.E., see
Fischer, R. 16.
Laschever, Z.E., see
Follis, R.H., Jr. 17.
Follis, R.H., Jr. 17. Lasfargues, E.Y.L.;
Wharton, D.R.A.; and
D1 Eine, J.C. 32.
Lasseur, Ph.; Combe, E.;
Lasseur, Ph.; Combe, E.; and Dupaix, A. 25.
; and Decker, R. 1.
a Namhmann D . and
Dupaix, A. 25.
; Dupaix, A.; and
Dombray, P. 18.
; Dupaix, A.; Marchal, J.;
and Combe, E. 7.
; and Dupaix-Lasseur, A. 4.
; etDupsix-Lasseur, A. 38.
; Dupaix-Lasseur, A.; and
Dombray, P. 21.
; Dupaix-Lasseur, A.; et
Escal, F. 21.
: Dupaix-Lasseur. A.
; Dupaix-Lasseur, A.; and Gavoille, M.Th. 11.
; Dupaix-Lasseur, A.;
and Georges, H. 38.
Dupaix-Lasseur, A.;
Georges, H.; et
Laurent, P. 1.
· Duraivalament
; Dupaix-Lasseur, A.;
and Moulin, A. 18, 26.
; Dupaix-Lasseur, A.;
Pepin, J.; Leveque, M.Th.;
Girard, Th.; and Aubert, J. 18.
AUDOTO, O. 18.
; Florentin, P.; Jacob, P.;
Dupaix-Lasseur, M.;
Gavoille. Th.: Melcion.J.:

et Giabicani, R. 21.

```
Lasseur, Ph.; (cont'd)
____; and Georges, H. 26.
; and Laroche, G. 18.
Marchal, J.G.; and
   Maguitot, C. 1.
 ___; et Melcion, J. 26.
 ____; and Palgren, W. 1.
  __; Vernier, P.; Dupaix, A.;
  and Combe, E. 26.
Launoy, L. 11, 38.
Laurent, P., see
Lasseur, Ph. 1.
Lazerus, A.S., see
    Crichton, P.C. 8.
Ledermann, K.G.; and
    Meyer, P.S. 21, 23.
Ledingham, G., see
Neish, A.C. 12.
Legallais, F.Y., see
    Algire, G.H. 29.
Lehman, S., see
    Dunn, T.B. 31.
Leiter, J., see
Seligman, A.M. 33.
Lemoigne, M. 11.
Leveque, M. Th., see
    Lasseur, Ph. 18.
Lichstein, H.C.; and
    Van de Sand, V.F. 35.
Lieben, F.; and Lowe, L. 11.
Lindet, 46.
Linnane, A.W.; and
    Still, J.L. 26.
Little, G.N., see
    Thomas, L. 39.
Loefer, J.B., see
    Meffered, R.B. 26.
Lowe, L., see
    Lieben, F. 11.
Lutsky, I.L.; and
    Bell, A.E. 18.
```

McConnell, J.R., see Reinmann, S.P. 33. Hallett, S.F.; and Shear, M.J. 32. Mc Entegart, M.G.; and Porterfield, J.S. 41. Mc Lean, D.J.; and Fisher, K.C. 11.
\_; and Purdie, E.F. 11. ; Purdie, E.F.; and Robinson, N.H. 12. ; Robinson, N.H.; and Purdie, E.F. 12. Mc Veigh, I., see Burkholder, P.R. 8. Maguitot, C., see Lasseue, Ph. 1. Mahl, H., see Jakob, A. 17. Malmgren, H. 32. Marchal, J.G. 38. Marchal, J.G., see Lasseur, Ph. 1, 7. \_; and Girard, Th. 18. ; Girard, Th.; and Nicot, R. 21. \_; Massignon, C.; and Thomas, P. 38. Marconi, E. 21 Marshall, N.S.; and Nordby, H.P. 4. Martin, S.P.; and Chaudhuri, S.N. Maschmann, E. 12. Maslova, A.S., see Semenov, V.E. 45. Massera, Enrico, 36. Massignon, C., see Marchal, J.G. 38. Mazzei, A. 41. Meffered, R.B.; and Loefer, J.B. 26. Meier, Rolf. 18.

Melcion, J., see Lasseur, Ph. 21, 26. Melcion, Rene. 1.
Meyer, P.S. 21, 23.
Meyer, P.S., see
Amster, S. 15.
Ledermann, K.G. 21, 23.
Most, Sylvia 32.
Moulin, A., see
Lasseur, Ph. 18, 26.
Moycho, W. 12, 26.
Murri, A. 41.
Mussa, B., and
Virando, A. 41.
Nagypal, I. 23.
Naylor, H.B.; and Smith, P.A.
21, 23.
Naish & C.

Naylor, H.B.; and Smith, P.A. Neish, A.C.; Blackwood, A.C.; Robertson, F.M.; and Ledingham, G. 12. \_; Ledingham, G.A. 12. Neuweiler, W. 37. Nicot, R., see Marchal, J.G. 21. Nikodemusz, I., see Risko, T. 42. Nilsson, R.; Alm; F.; and Burström, D. Nishimura, E.T., see Creech, H.J. Nisimura, K. 13. Nordby, H.P., see Marshall, M.S. 4. Novelli, A. 26.

Oakey, R., see
Reinmann, S.P. 33.
Oehler, R. 36.
Oliveira, J.J.A.De. 46.
Ozek, Omer. 18.

Paine, T.F. - 41.
Palacios, G., see
Bhat, J.V. 48.
Palgen, W., see
Lasseur, Ph. 1.

Palmer, C., see Appleton, J.L.T. 47. Paraschivesco, Z. 38. Park, H.D., see Algire, G.H. Parker, J.T. 37. Payne, W.J.; Gagan, S.J.; and Pollard, A.L. 32. Pederson, C.S.; and Breed, R.S. 13. Pepin, J., see Lasseur, Ph. 18. Peppler, H.J. 47. Perrault, A., see Shear, M.J. 32, Peters, F., see Busing, K.H. 8. Petersen, H., see Jensen, H.L. 10 Pietraszkiewiczowa, H., see Kwapinski, J. 25. Pincussen, L., see Bergeim, O. 49. Pistelli, F. 22. Poe, C.F.; and Hawkins, J.C. 26. Poel, W.E.; Belkin, M.; and Chagnon, C. Politi, I.; Cola, C.; and Benetti, R. 18. Pollard, A.L., see Payne, W.J. 32. Porterfield, J.S., see McEntegart, M.G. Povelitsa, F.D.; and Boldyreva, L.V. 35. Proctor, B.E., see Fram, H. 20. Pugnani, E. 41. Pulvirenti, G.B. 27. Purdie, E.F., see McLean, D.J. 11, 12.

Rabinowitz, K.; and Schriffin, R. 42. Ramchandani, J.C. 4. Ran, V.G. 36. Rathgeb, P.; and Sylvan, B. 33. Reardon, L.V., see Chinn, B.D. 44. Reed, G.B. 7. Rees, C.W., see Chinn, B.D. 44. Reinmann, S.P.; Hollman, A.L.; Oakey, R.; McConnell, J.R.; and Shear, M.J. Rettger, L.F., see Berman, N. 8. Koser, S.A. 11. Sturges, W.S. 14. Rheingold, J.C. 42. Rickert, D., see Franke, F.E. 31. Rimington, C., see Hubbard, R. 24. Risko, T.; Nikodemusz, I.; and Tomka, I. 42. Robertson, F.M.; see Neish, A.C. 12. Robinson, C.F., see Bunting, M.C. 24. Robinson, N.H., see Mc Lean, D.J. 12. Rodrigues, Č.,e Guida, V.O. 18. Rogers, H., see Stein, C.D. 22. Rosahn, P.D.; and Ju, C.K. 42. Rosebury, T. 47. Rothhaas, A., see Wrede, F. 27. Rotini, O.T. 13. Rouquier, A.; and Tricoire, R. 19. Ruska, H. 13.

"Saba, Bruno. 13. Sablatnög, A., see
Sablatnög, A., see
Gorbach, G. 28.
Sack, T., see
Seligman, A.M. 33.
; and Seligman, A.M. 33.
; and Seligman, A.M. 33. Sangiorgi, G. 7.
Sapuppo, R., see
Gutin, M. 40.
Schad, G. 2.
Schieblich, M. 13.
Schioppa, L. 46.
achiona g v 30
Schlang, H.A. 39.
Schollmeyer, J. 13.
Schreiner, R.; and
Snow, L.M. 2, Schriffin, R., see
Schriffin, R., see
Rabinowitz, K. 42.
Schwartzman, G. 39.
Schwartzman, G. 39. Seedon, H.R. 46.
Seligman, A.M., see
Seligman, A.M., see Sack, T. 33.
Seligman, A.M.;
Leiter, J.; Sweet, B.;
and Shear, M.J. 33.
Seligman, A.M.; Shear, M.J.;
Leiter, J.; and
Sweet, B. 33.
Seligmann, E., see
Wassermann, M.M. 43.
Seltzer B. see
Seltzer, B., see Beck, L.V. 29. Semenov, V.E.; and
Semenary V E + and
Verlage A G J.5
Maslova, A.S. 45. Serra, G. 19.
Sham W 1 22
Shear, M.J. 33.
, see
Drues, A.M. 50.
Creech, n.J. 50.
Brues, A.M. 30. Creech, H.J. 30. Diller, I.C. 31. Hartwell, J.L. 31.
Martwell, J.L. 31.
Kahler, H. 32.
McGonnell, J.R. 32.
Perrault, A. 32.
Reinmann, S.P. 33.

Shear, M.J. (cont'd)
. 566
; and Adams, J.R.Jr. 33.; and Perrault, A. 33.
and Perrault, A. 33.
Perrault, A.; and
Adams, J.R. 34.
and Turner, F.G. 34.
shimkin, M.B.; and Zon, L. 34.
Snimkin, M.D., and
Silliker, J.H.; and
Rittenberg, S.C. 13. Singh, B.N. 36.
Singh, B.N., 30
Skerman, P.J. 46. Skrynska, J. 47.
Skrynska, J. 47.
Slavnina. G.P., ~.
Smith, P.A., see Naylor, H.B. 21, 23.
Naylor, H.B. 21, 23.
Charl T. W. EAR
Schreiner, R. 2.
Stein, C.D.; and
Pagers H. 22.
Rogers, H. 22. Steinhaus, E.A. 46.
and Birkeland, J.M. 4.
and birketand, ours 4.
Still, J.L., see
Goldsworthy, N.E. 24.
Still, J.L., see
Linnane, A.W. 26.
Stille, Bernd. 22.
Stone, R.W.: and
Warkman, C.H. 14.
Stuart, C.A., see
Kidder, G.W. 35.
Supplee, G.C. 46.
Sweet B. 866
Seligmen, A.M. 33.
Seligman, A.M. 33. Swiatopelk-Zawadski 14.
Owig to between the
Sylven, D., See
Sylven, B., see Rathgeb, P. 33. Symon, Karel. 2.
Symon, Maret. 4.
Tekasa Akira 19.
Takase, Akira 19. Tanner, R.W.; and
Windsor, M.F. 22, 23.
MINIMAL O 27
Tarantino, C. 27.

Tarr, H.L.A. 14. Testa, E. 2, 27. Thaysen, A.C., see Hutchinson, G.B. 37. Theisman, H., see Füchtbauer, H. 20. ; and Wallhause, K.H. Thevenot. L., see Arloing, F. 15. Thomas, L.; and Good, R.A. 42. ; Good, R.A.; and Little, J.N. 39. Thomas, P., see Marchal, J.G. 38. Thompson, J.L. 42. Thompson, R.C. 14. Tolman, R.C.; Guernsey, E.W.; Charleston, V.D.; and Dougherty, R.H. Tomka, I., See Risko, T. 42. Tricoire, R., see Rouquier, A. 19. Trillet, A. 4. Trillot, Jean-Jacques. 22. Turner, F.C., see Shear, M.J. 34. Tuttle, W.M.; and Cannon, P.R. 42. Velu, H.; and Balozet, L. Vernier, P., see Lasseur, Ph. 26. Virando, A. 42.

\_\_, see Mussa, B. 41.

Wahlin, J.G. 14. \_; and Almaden, P.J. 4. Wallhause, K.H., see Theisman, H. Waring, W.S.; and Werkman, C.H. 14. Wassermann, M.M.; and Seligmann, E. 43. Webb Mary. 19. Weber, D., see Gurevitch, J. 40. Wedberg, S.E.; Brandt, C.D.; and Helmboldt, C.F. 49. Weil, A.J. 27, 39. Weiss, E., see Bergeim, O. 49. Werkman, C.H., see Stone, R.W. 14. , 566 Waring, W.S. 14. Westfall, B.B.; and Dunn, TB.34. Wharton, D.R.A., see Creech, H.J. 30. Lasfargues, E.Y.L. 32. ; and Creech, H.J. 34. Wilson, K., see Burkholder, P.R. 8. Wilson, W.L., see Heilbrunn, L.V. 31. Windsor, M.F., see Tanner, R.W. 22, 23. Winkler, K.C. 19. Witlin, B., see Gershenfeld, L. 17. Wolff, L.K., see Kraay, G.M. 11. Woolpert, C., see Dack, G.M. 49. Wrede, F. 27. \_; and Hettche, O. 27. ; and Rothhaas, A. 27. Zamenhof, S.; Brawerman, G.; and Chargaff, E.B. 14.